AR TARGET SHEET

The following document was too large to scan as one unit, therefore, it has been broken down into sections.

EDMC#: 0062811
SECTION: 10 OF 15

DOCUMENT #: WA7890008967 Rev 8

TITLE: Hanford Facility RCRA Permit, Dangerous Waste Portion, Rev 008, 9/04

ATTACHMENT 36
325 Hazardous Waste Treatment Units

Contents

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Contents

1.0 PART A, DANGEROUS WASTE PERMIT

The following is the 325 Hazardous Waste Treatment Units (325 HWTUs) Part A, Form 3, history.

Revision 0 of the Part A, Form 3, was submitted May 19, 1988.

- Revision 1 of the Part A, Form 3, submitted June 30, 1992.
- Revision 2 of the Part A, Form 3, March 1, 1993, more accurately defined the activities proposed to occur within the 325 portion (325 HWTU) of the 325/3100 Hazardous Waste Treatment Unit. Earlier revisions to the application limited the processes to be conducted in the 325 HWTU to stabilization and alkali metal treatments. The revised permit application specifies the treatments to be conducted in the 325 HWTU: pH adjustment, ion exchange, carbon absorption, oxidation, reduction, waste concentration by evaporation, precipitation, filtration, liquid/solids separation, catalytic destruction, grouting, encapsulation, and stabilization. Added waste codes inadvertently left out of Revision 1. Corrected the total storage capacity of the 325/3100 Hazardous Waste Treatment Unit to 5500 gallons to accurately reflect the combined storage capacity of both treatment portions. The storage capacity specified for the 325 HWTU was reduced from 1000 to 500 gallons.
- Revision 3 of the Part A, Form 3, December 2, 1994, deleted the 3100 Facility from the 325/3100 Hazardous Waste Treatment Unit Part A (Form 3) Permit Application. The 3100 facility project has no funding, no activities identified for it, and has never existed. Consolidated the 325 Shielded Analytical Laboratory (SAL) and activities under the 325 Hazardous Waste Treatment Unit Part A (Form 3). The 325 SAL was operating under Physical/Chemical Treatment Facilities Part A (Form 3). This action allowed the Pacific Northwest Laboratory (PNL) and the U.S. Department of Energy, Richland Operation Office (RL) to consolidate similar 325 Building activities under the same management within the same Part A (Form 3) and eventually the same Part B permit application.
- Revision 4 of the Part A, Form 3, submitted June 30, 1997, addressed close out of the Notice of Intent (NOI) process that began in 1995 for the HWTUs and gained interim status for the portions of the facility named in Revision 4. Acquisition of interim status by July 29, 1997, was necessary to assure that further extensions or other actions to authorize storage of mixed waste in the HWTUs, specifically tank TK-1, was not needed from the State of Washington Department of Ecology (Ecology). The 45-day NOI comment period was complete July 24, 1997 and per WAC 173-303-281(3)(b), submittal of the revised Form 3 was appropriate at that time. Revision 4 of Form 3, submitted to DOE RL STO on July 24 stated the Revision 4 provided the 325 Building with tank storage capability, which will eliminate that facility's dependency on the 300 Area Radioactive Liquid Waste System for disposal of liquid radioactive or mixed waste. It also provided conforming changes to the quantities and types of waste managed.
- Revision 4A of the Part A, Form 3, dated June 30, 2000, addresses the installation of the Radioactive Liquid Waste Tank (RLWT) system.
- Revision 4B of the Part A, Form 3, dated March 2002, addresses the addition of Room 524 to the 325 HWTU. Waste number P191 and K044 were added.
- Revision 4C of the Part A, Form 3, dated December 2002, was submitted as Attachment 36, Chapter 1.0.
- Revision 4D, of the Part A, dated April 2004, was revised to reflect the procedural closure of the RLWT system.

FORM 3

DANGEROUS WASTE PERMIT APPLICATION

I. EPA/State I.D.. No.

W	A	7	8	9	0	0	0	8	9	6	7

R OFFICIAL USE ONLY

Application Approved	Date Received (month/ day / year)	Comments

II. FIRST OR REVISED APPLICATION

Place an "X" in the appropriate box in A or B below (mark one box only) to indicate whether this is the first application you are submitting for your facility or a revised application. If this is your first application and you already know your facility's EPA/STATE I.D. Number, or If this is a revised application, enter your facility's EPA/STATE I.D. Number in Section I above.

A. First Application (place an "X" below and provide the appropriate date)

☐ 1. **Existing Facility** (See instructions for definition of "existing" facility. Complete item below.)

MO	DAY	YEAR
03	22	1943

*For existing facilities, provide the date (mo/day/yr) operation began or the date construction commenced. (use the boxes to the left)

*The date construction of the Hanford Facility commenced

☐ 2. **New Facility** (Complete item below.)

MO	DAY	YEAR

For new facilities, provide the date (mo/day/yr) operation began or is expected to begin

B. Revised Application (Place an "X" below and complete Section I above)

☒ **1. Facility has an interim Status Permit**

☒ **2. Facility has a Final Permit**

III. PROCESSES – CODES AND DESIGN CAPACITIES

A. Process Code – Enter the code from the list of process codes below that best describes each process to be used at the facility. Ten lines are provided for entering codes. If more lines are needed, enter the codes(s) in the space provided. If a process will be used that is not included in the list of codes below, then describe the process (including its design capacity) in the space provided on the (Section III-C).

B. Process Design Capacity – For each code entered in column A enter the capacity of the process.

1. Amount – Enter the amount.

2. Unit of Measure – For each amount entered in column B(1), enter the code from the list of unit measure codes below that describes the unit of measure used. Only the units of measure that are listed below should be used.

PROCESS	PROCESS CODE	APPROPRIATE UNITS OF MEASURE FOR PROCESS DESIGN CAPACITY
STORAGE:		
Container (barrel, drum, etc.)	S01	Gallons or liters
Tank	S02	Gallons or liters
Waste pile	S03	Cubic yards or cubic meters
Surface impoundment	S04	Gallons or liters
	S06	Cubic yards or cubic meters*
DISPOSAL:		
Injection well	D80	Gallons or liters
Landfill	D81	Acre-feet (the volume that would cover one acre to a Depth of one foot) or hectare-meter
Land application	D82	Acres or hectares
Ocean disposal	D83	Gallons per day or liters per day
Surface impoundment	D84	Gallons or liters
TREATMENT:		
Tank	T01	Gallons per day or liters per day
Surface impoundment	T02	Gallons per day or liters per day
Incinerator	T03	Tons per hour or metric tons per hour; gallons per hour or liters per hour
Other (use for physical, chemical, thermal or biological treatment processes not occurring in tanks, surface impoundments or incinerators. Describe the processes in the space provided; Section III-C.)	T04	Gallons per day or liters per day

Unit of Measure	Unit of Measure Code	Unit of Measure	Unit of Measure Code	Unit of Measure	Unit of Measure Code
Gallons	G	Liters Per Day	V	Acre-Feet	A
Liters	L	Tons Per Hour	D	Hectare-Meter	F
Cubic Yards	Y	Metric Tons Per Hour	W	Acres	B
Cubic Meters	C	Gallons Per Hour	E	Hectares	Q
Gallons Per Day	U	Liters Per Hour	H		

*Add per request of Washington State Department of Ecology (01/2001)

III. PROCESS – CODES AND DESIGN CAPACITIES (continued)

Example for Completing Section III (shown in line numbers X-1 and X-2 below): A facility has two storage tanks; one tank can hold 200 gallons and the other can hold 400 gallons. The facility also has an incinerator that can burn up to 20 gallons per hour.

Line No.	A. Process Code (from list above)			B. process Design Capacity: 1. Amount (Specify)	2. Unit of Measure (enter code)			For Official Use Only			
X-1	*S*	*0*	*2*	*600*		*G*					
X-2	*T*	*0*	*3*	*20*		*E*					
1	S	0	1	12,000		L					
2	T	0	4	1,514		V					
3	S	0	2	1,218		L					
4	T	0	1	1,218		V					
5											
6											
7											
8											
9											
10											

C. Space for additional process codes or for describing other process (code "T04"). For each process entered here include design capacity.

S01, T04, S02, T01

The 325 Hazardous Waste Treatment Units (325 HWTUs) consist of the Shielded Analytical Laboratory (SAL) which includes Rooms 32, 200, 201, 202, and 203; and the Hazardous Waste Treatment Unit (HWTU) encompassing Rooms 520, 524 and 528 of the 325 Building. The 325 HWTUs began waste management operations in 1991 (SAL) and 1995 (HWTU). Up to 12,000 liters of dangerous and/or mixed waste may be stored in containers in the 325 HWTUs (S01). A maximum of 1514 liters of dangerous and/or mixed waste may be treated per day in containers in the 325 HWTUs (T04).

A maximum of 1,218 liters of dangerous and/or mixed waste may be stored in tanks in the 325 HWTUs (S02). A maximum of 1,218 liters of dangerous and/or mixed waste may be treated in tanks per day in the 325 HWTUs (T01).

Dangerous and/or mixed waste treatments are generally conducted as small bench-scale operations except for in-tank treatments. Treatment processes utilized at the 325 HWTUs may include the following:

T11	Molten salt destructor	T35	Centrifugation	T55	Electrodialysis
T12	Pyrolysis	T36	Clarification	T56	Electrolysis
T13	Wet air oxidation	T37	Coagulation	T57	Evaporation
T14	Calcination	T38	Decanting	T58	High gradient magnetic separation
T15	Microwave discharge	T39	Encapsulation	T59	Leaching
T18	Other thermal treatment	T40	Filtration	T60	Liquid ion exchange
T21	Chemical fixation	T41	Flocculation	T61	Liquid-liquid extraction
T22	Chemical oxidation	T42	Flotation	T62	Reverse osmosis
T23	Chemical precipitation	T43	Foaming	T63	Solvent recovery
T24	Chemical reduction	T44	Sedimentation	T64	Stripping
T25	Chlorination	T45	Thickening	T65	Sand filter
T26	Chlorinolysis	T46	Ultrafiltration	T66	Other removal technology
T27	Cyanide destruction	T47	Other separation technology	T67	Activated sludge
T28	Degradation	T48	Absorption-molecular sieve	T69	Aerobic tank
T29	Detoxification	T49	Activated carbon	T70	Anaerobic lagoon or tank
T30	Ion exchange	T50	Blending	T71	Composting
T31	Neutralization	T51	Catalysis	T74	Thickening filter
T32	Ozonation	T52	Crystallization	T75	Trickling filter
T33	Photolysis	T53	Dialysis	T77	Other biological treatment
T34	Other chemical treatment	T54	Distillation		

IV. DESCRIPTION OF DANGEROUS WASTES

A. Dangerous Waste Number – Enter the digit number from Chapter 173-303 WAC for each listed dangerous waste you will handle. If you handle dangerous wastes which are not listed in Chapter 173-303 WAC, enter the four-digit number(s) that describes the characteristics and/or the toxic contaminants of those dangerous wastes.

B. Estimated Annual Quantity - For each listed waste entered in column A, estimate the quantity of that waste that will be handled on an annual basis. For each characteristic or toxic contaminant entered in column A, estimate the total annual quantity of all the non-listed waste(s) that will be handled which possess that characteristic or contaminant.

C. Unit of Measure - For each quantity entered in column B enter the unit of measure code. Units of measure which must be used and the appropriate odes are:

ENGLISH UNIT OF MEASURE	CODE	METRIC UNIT OF MEASURE	CODE
Pounds	P	Kilograms	K
Tons	T	Metric Tons	M

If facility records use any other unit of measure for quantity, the units of measure must be converted into one of the required units of measure taking into account the appropriate density or specific gravity of the waste.

D. Processes

1. Process Codes:

For listed dangerous waste: For each listed dangerous waste entered in column A select the code(s) from the list of process codes contained in Section III to indicate how the waste will be stored, treated, and/or disposed of at the facility.

For non-listed dangerous wastes: For each characteristic or toxic contaminant entered in Column A, select the code(s) from the list of process codes contained in Section III to indicate all the processes that will be used to store, treat, and/or dispose of all the non-listed dangerous wastes that possess that characteristic or toxic contaminant.

Note: Four spaces are provided for entering process codes. If more are needed: (1) Enter the first three as described above; (2) Enter "000" in the extreme right box of item IV-D(1); and (3) Enter in the space provided on page 4, the line number and the additional code(s).

2. Process Description: If a code is not listed for a process that will be used, describe the process in the space provided on the form.

NOTE: DANGEROUS WASTES DESCRIBED BY MORE THAN ONE DANGEROUS WASTE NUMBER - Dangerous wastes that can be described by more than one Waste Number shall be described on the form as follows:

1. Select one of the Dangerous Waste Numbers and enter it in column A. On the same line complete columns B, C, and D by estimating the total annual quantity of the waste and describing all the processes to be used to treat, store, and/or dispose of the waste.
2. In column A of the next line enter the other Dangerous Waste Number that can be used to describe the waste. In column D(2) on that line enter "Included with above" and make no other entries on that line.
3. Repeat step 2 for each other Dangerous Waste Number that can be used to describe the dangerous waste.

Example for completing Section IV (shown in line numbers X-1, X-2, X-3, and X-4 below) - A facility will treat and dispose of an estimated 900 pounds per year of chrome shavings from leather tanning and finishing operation. In addition, the facility will treat and dispose of three non-listed wastes. Two wastes are corrosive only and there will be an estimated 200 pounds per year of each waste.

Line No.	A. Dangerous Waste No. *(enter code)*				B. Estimated Annual Quantity of Waste	C. Unit of Measure *(enter code)*			D. Processes				
									1. Process Codes *(enter)*				2. Process Description *(if a code is not entered in D(1))*
X-1	*K*	*0*	*5*	*4*	*900*		*P*		*T03*	*D80*			
X-2	*D*	*0*	*0*	*2*	*400*		*P*		*T03*	*D80*			
X-3	*D*	*0*	*0*	*1*	*100*		*P*		*T03*	*D80*			
X-4	*D*	*0*	*0*	*2*					*T03*	*D80*			*Included with above*

Photocopy this page before completing if you have more than 26 wastes to list.

I.D. Number *(enter from page 1)*
W A 7 8 9 0 0 0 8 9 6 7

IV. DESCRIPTION OF DANGEROUS WASTES *(continued)*

Line No.	A. Dangerous Waste No. *(enter code)*				B. Estimated Annual Quantity of Waste	C. Unit of Measure *(enter code)*			D. Processes 1. Process Codes *(enter)*				D. Processes 2. Process Description *(if a code is not entered in D(1))*
1	D	0	0	1	82,500* *[60,000 (S01); 22,500 (T04)]	K			S01	T04			Storage-Container/Treatment-Other
2	D	0	0	2		K			S01	T04			Storage-Container/Treatment-Other
3	D	0	0	3		K			S01	T04			Storage-Container/Treatment-Other
4	D	0	0	4		K			S01	T04			Storage-Container/Treatment-Other
5	D	0	0	5		K			S01	T04			Storage-Container/Treatment-Other
6	D	0	0	6		K			S01	T04			Storage-Container/Treatment-Other
7	D	0	0	7		K			S01	T04			Storage-Container/Treatment-Other
8	D	0	0	8		K			S01	T04			Storage-Container/Treatment-Other
9	D	0	0	9		K			S01	T04			Storage-Container/Treatment-Other
10	D	0	1	0		K			S01	T04			Storage-Container/Treatment-Other
11	D	0	1	1		K			S01	T04			Storage-Container/Treatment-Other
12	D	0	1	2		K			S01	T04			Storage-Container/Treatment-Other
13	D	0	1	3		K			S01	T04			Storage-Container/Treatment-Other
14	D	0	1	4		K			S01	T04			Storage-Container/Treatment-Other
15	D	0	1	5		K			S01	T04			Storage-Container/Treatment-Other
16	D	0	1	6		K			S01	T04			Storage-Container/Treatment-Other
17	D	0	1	7		K			S01	T04			Storage-Container/Treatment-Other
18	D	0	1	8		K			S01	T04			Storage-Container/Treatment-Other
19	D	0	1	9		K			S01	T04			Storage-Container/Treatment-Other
20	D	0	2	0		K			S01	T04			Storage-Container/Treatment-Other
21	D	0	2	1		K			S01	T04			Storage-Container/Treatment-Other
22	D	0	2	2		K			S01	T04			Storage-Container/Treatment-Other
23	D	0	2	3		K			S01	T04			Storage-Container/Treatment-Other
24	D	0	2	4		K			S01	T04			Storage-Container/Treatment-Other
25	D	0	2	5		K			S01	T04			Storage-Container/Treatment-Other
26	D	0	2	6		K			S01	T04			Storage-Container/Treatment-Other
27	D	0	2	7		K			S01	T04			Storage-Container/Treatment-Other
28	D	0	2	8		K			S01	T04			Storage-Container/Treatment-Other
29	D	0	2	9		K			S01	T04			Storage-Container/Treatment-Other
30	D	0	3	0		K			S01	T04			Storage-Container/Treatment-Other
31	D	0	3	1		K			S01	T04			Storage-Container/Treatment-Other
32	D	0	3	2		K			S01	T04			Storage-Container/Treatment-Other
33	D	0	3	3		K			S01	T04			Storage-Container/Treatment-Other
34	D	0	3	4		K			S01	T04			Storage-Container/Treatment-Other
35	D	0	3	5		K			S01	T04			Storage-Container/Treatment-Other
36	D	0	3	6		K			S01	T04			Storage-Container/Treatment-Other
37	D	0	3	7		K			S01	T04			Storage-Container/Treatment-Other
38	D	0	3	8		K			S01	T04			Storage-Container/Treatment-Other
39	D	0	3	9		K			S01	T04			Storage-Container/Treatment-Other
40	D	0	4	0		K			S01	T04			Storage-Container/Treatment-Other
41	D	0	4	1		K			S01	T04			Storage-Container/Treatment-Oth
42	D	0	4	2		K			S01	T04			Storage-Container/Treatment-Other
43	D	0	4	3		K			S01	T04			Storage-Container/Treatment-Other
44	F	0	0	1		K			S01	T04			Storage-Container/Treatment-Other
45	F	0	0	2		K			S01	T04			Storage-Container/Treatment-Other

Photocopy this page before completing if you have more than 26 wastes to list.

I.D. Number *(enter from page 1)*
A 7 8 9 0 0 0 8 9 6 7

IV. DESCRIPTION OF DANGEROUS WASTES *(continued)*

Line No.	A. Dangerous Waste No. *(enter code)*				B. Estimated Annual Quantity of Waste	C. Unit of Measure *(enter code)*			D. Processes 1. Process Codes *(enter)*				D. Processes 2. Process Description *(if a code is not entered in D(1))*
46	F	0	0	3		K			S01	T04			Storage-Container/Treatment-Other
47	F	0	0	4		K			S01	T04			Storage-Container/Treatment-Other
48	F	0	0	5		K			S01	T04			Storage-Container/Treatment-Other
49	F	0	2	7		K			S01	T04			Storage-Container/Treatment-Other
50	F	0	3	9		K			S01	T04			Storage-Container/Treatment-Other
51	K	0	1	1		K			S01	T04			Storage-Container/Treatment-Other
52	K	0	1	3		K			S01	T04			Storage-Container/Treatment-Other
53	K	0	4	4		K			S01	T04			Storage-Container/Treatment-Other
54	K	0	4	8		K			S01	T04			Storage-Container/Treatment-Other
55	K	0	4	9		K			S01	T04			Storage-Container/Treatment-Other
56	K	0	5	0		K			S01	T04			Storage-Container/Treatment-Other
57	K	0	5	1		K			S01	T04			Storage-Container/Treatment-Other
58	K	0	5	2		K			S01	T04			Storage-Container/Treatment-Other
59	P	0	0	1		K			S01	T04			Storage-Container/Treatment-Other
60	P	0	0	2		K			S01	T04			Storage-Container/Treatment-Other
61	P	0	0	3		K			S01	T04			Storage-Container/Treatment-Other
62	P	0	0	4		K			S01	T04			Storage-Container/Treatment-Other
[illegible]	P	0	0	5		K			S01	T04			Storage-Container/Treatment-Other
64	P	0	0	6		K			S01	T04			Storage-Container/Treatment-Other
65	P	0	0	7		K			S01	T04			Storage-Container/Treatment-Other
66	P	0	0	8		K			S01	T04			Storage-Container/Treatment-Other
67	P	0	0	9		K			S01	T04			Storage-Container/Treatment-Other
68	P	0	1	0		K			S01	T04			Storage-Container/Treatment-Other
69	P	0	1	1		K			S01	T04			Storage-Container/Treatment-Other
70	P	0	1	2		K			S01	T04			Storage-Container/Treatment-Other
71	P	0	1	3		K			S01	T04			Storage-Container/Treatment-Other
72	P	0	1	4		K			S01	T04			Storage-Container/Treatment-Other
73	P	0	1	5		K			S01	T04			Storage-Container/Treatment-Other
74	P	0	1	6		K			S01	T04			Storage-Container/Treatment-Other
75	P	0	1	7		K			S01	T04			Storage-Container/Treatment-Other
76	P	0	1	8		K			S01	T04			Storage-Container/Treatment-Other
77	P	0	2	0		K			S01	T04			Storage-Container/Treatment-Other
78	P	0	2	1		K			S01	T04			Storage-Container/Treatment-Other
79	P	0	2	2		K			S01	T04			Storage-Container/Treatment-Other
80	P	0	2	3		K			S01	T04			Storage-Container/Treatment-Other
81	P	0	2	4		K			S01	T04			Storage-Container/Treatment-Other
82	P	0	2	6		K			S01	T04			Storage-Container/Treatment-Other
83	P	0	2	7		K			S01	T04			Storage-Container/Treatment-Other
84	P	0	2	8		K			S01	T04			Storage-Container/Treatment-Other
85	P	0	2	9		K			S01	T04			Storage-Container/Treatment-Other
[illegible]6	P	0	3	0		K			S01	T04			Storage-Container/Treatment-Other
[illegible]7	P	0	3	1		K			S01	T04			Storage-Container/Treatment-Other
88	P	0	3	3		K			S01	T04			Storage-Container/Treatment-Other
89	P	0	3	4		K			S01	T04			Storage-Container/Treatment-Other
90	P	0	3	6		K			S01	T04			Storage-Container/Treatment-Other
91	P	0	3	7		K			S01	T04			Storage-Container/Treatment-Other

Photocopy this page before completing if you have more than 26 wastes to list.

I.D. Number *(enter from page 1)*											
W	A	7	8	9	0	0	0	8	9	6	7

IV. DESCRIPTION OF DANGEROUS WASTES *(continued)*

Line No.	A. Dangerous Waste No. *(enter code)*				B. Estimated Annual Quantity of Waste	C. Unit of Measure *(enter code)*			D. Processes 1. Process Codes *(enter)*				D. Processes 2. Process Description *(if a code is not entered in D(1))*
92	P	0	3	8		K			S01	T04			Storage-Container/Treatment-Other
93	P	0	3	9		K			S01	T04			Storage-Container/Treatment-Other
94	P	0	4	0		K			S01	T04			Storage-Container/Treatment-Other
95	P	0	4	1		K			S01	T04			Storage-Container/Treatment-Other
96	P	0	4	2		K			S01	T04			Storage-Container/Treatment-Other
97	P	0	4	3		K			S01	T04			Storage-Container/Treatment-Other
98	P	0	4	4		K			S01	T04			Storage-Container/Treatment-Other
99	P	0	4	5		K			S01	T04			Storage-Container/Treatment-Other
100	P	0	4	6		K			S01	T04			Storage-Container/Treatment-Other
101	P	0	4	7		K			S01	T04			Storage-Container/Treatment-Other
102	P	0	4	8		K			S01	T04			Storage-Container/Treatment-Other
103	P	0	4	9		K			S01	T04			Storage-Container/Treatment-Other
104	P	0	5	0		K			S01	T04			Storage-Container/Treatment-Other
105	P	0	5	1		K			S01	T04			Storage-Container/Treatment-Other
106	P	0	5	4		K			S01	T04			Storage-Container/Treatment-Other
107	P	0	5	6		K			S01	T04			Storage-Container/Treatment-Other
108	P	0	5	7		K			S01	T04			Storage-Container/Treatment-Other
109	P	0	5	8		K			S01	T04			Storage-Container/Treatment-Oth
110	P	0	5	9		K			S01	T04			Storage-Container/Treatment-Other
111	P	0	6	0		K			S01	T04			Storage-Container/Treatment-Other
112	P	0	6	2		K			S01	T04			Storage-Container/Treatment-Other
113	P	0	6	3		K			S01	T04			Storage-Container/Treatment-Other
114	P	0	6	4		K			S01	T04			Storage-Container/Treatment-Other
115	P	0	6	5		K			S01	T04			Storage-Container/Treatment-Other
116	P	0	6	6		K			S01	T04			Storage-Container/Treatment-Other
117	P	0	6	7		K			S01	T04			Storage-Container/Treatment-Other
118	P	0	6	8		K			S01	T04			Storage-Container/Treatment-Other
119	P	0	6	9		K			S01	T04			Storage-Container/Treatment-Other
120	P	0	7	0		K			S01	T04			Storage-Container/Treatment-Other
121	P	0	7	1		K			S01	T04			Storage-Container/Treatment-Other
122	P	0	7	2		K			S01	T04			Storage-Container/Treatment-Other
123	P	0	7	3		K			S01	T04			Storage-Container/Treatment-Other
124	P	0	7	4		K			S01	T04			Storage-Container/Treatment-Other
125	P	0	7	5		K			S01	T04			Storage-Container/Treatment-Other
126	P	0	7	6		K			S01	T04			Storage-Container/Treatment-Other
127	P	0	7	7		K			S01	T04			Storage-Container/Treatment-Other
128	P	0	7	8		K			S01	T04			Storage-Container/Treatment-Other
129	P	0	8	1		K			S01	T04			Storage-Container/Treatment-Other
130	P	0	8	2		K			S01	T04			Storage-Container/Treatment-Other
131	P	0	8	4		K			S01	T04			Storage-Container/Treatment-Other
132	P	0	8	5		K			S01	T04			Storage-Container/Treatment-Other
133	P	0	8	7		K			S01	T04			Storage-Container/Treatment-Ot
134	P	0	8	8		K			S01	T04			Storage-Container/Treatment-Other
135	P	0	8	9		K			S01	T04			Storage-Container/Treatment-Other
136	P	0	9	2		K			S01	T04			Storage-Container/Treatment-Other
137	P	0	9	3		K			S01	T04			Storage-Container/Treatment-Other

Photocopy this page before completing if you have more than 26 wastes to list.

I.D. Number *(enter from page 1)*
A 7 8 9 0 0 0 8 9 6 7

IV. DESCRIPTION OF DANGEROUS WASTES *(continued)*

Line No.	A. Dangerous Waste No. *(enter code)*				B. Estimated Annual Quantity of Waste	C. Unit of Measure *(enter code)*			D. Processes 1. Process Codes *(enter)*				D. Processes 2. Process Description *(if a code is not entered in D(1))*
138	P	0	9	4		K			S01	T04			Storage-Container/Treatment-Other
139	P	0	9	5		K			S01	T04			Storage-Container/Treatment-Other
140	P	0	9	6		K			S01	T04			Storage-Container/Treatment-Other
141	P	0	9	7		K			S01	T04			Storage-Container/Treatment-Other
142	P	0	9	8		K			S01	T04			Storage-Container/Treatment-Other
143	P	0	9	9		K			S01	T04			Storage-Container/Treatment-Other
144	P	1	0	1		K			S01	T04			Storage-Container/Treatment-Other
145	P	1	0	2		K			S01	T04			Storage-Container/Treatment-Other
146	P	1	0	3		K			S01	T04			Storage-Container/Treatment-Other
147	P	1	0	4		K			S01	T04			Storage-Container/Treatment-Other
148	P	1	0	5		K			S01	T04			Storage-Container/Treatment-Other
149	P	1	0	6		K			S01	T04			Storage-Container/Treatment-Other
150	P	1	0	8		K			S01	T04			Storage-Container/Treatment-Other
151	P	1	0	9		K			S01	T04			Storage-Container/Treatment-Other
152	P	1	1	0		K			S01	T04			Storage-Container/Treatment-Other
153	P	1	1	1		K			S01	T04			Storage-Container/Treatment-Other
154	P	1	1	2		K			S01	T04			Storage-Container/Treatment-Other
155	P	1	1	3		K			S01	T04			Storage-Container/Treatment-Other
156	P	1	1	4		K			S01	T04			Storage-Container/Treatment-Other
157	P	1	1	5		K			S01	T04			Storage-Container/Treatment-Other
158	P	1	1	6		K			S01	T04			Storage-Container/Treatment-Other
159	P	1	1	8		K			S01	T04			Storage-Container/Treatment-Other
160	P	1	1	9		K			S01	T04			Storage-Container/Treatment-Other
161	P	1	2	0		K			S01	T04			Storage-Container/Treatment-Other
162	P	1	2	1		K			S01	T04			Storage-Container/Treatment-Other
163	P	1	2	2		K			S01	T04			Storage-Container/Treatment-Other
164	P	1	2	3		K			S01	T04			Storage-Container/Treatment-Other
165	P	1	2	7		K			S01	T04			Storage-Container/Treatment-Other
166	P	1	2	8		K			S01	T04			Storage-Container/Treatment-Other
167	P	1	8	5		K			S01	T04			Storage-Container/Treatment-Other
168	P	1	8	8		K			S01	T04			Storage-Container/Treatment-Other
169	P	1	8	9		K			S01	T04			Storage-Container/Treatment-Other
170	P	1	9	0		K			S01	T04			Storage-Container/Treatment-Other
171	P	1	9	1		K			S01	T04			Storage-Container/Treatment-Other
172	P	1	9	2		K			S01	T04			Storage-Container/Treatment-Other
173	P	1	9	4		K			S01	T04			Storage-Container/Treatment-Other
174	P	1	9	6		K			S01	T04			Storage-Container/Treatment-Other
175	P	1	9	7		K			S01	T04			Storage-Container/Treatment-Other
176	P	1	9	8		K			S01	T04			Storage-Container/Treatment-Other
177	P	1	9	9		K			S01	T04			Storage-Container/Treatment-Other
178	P	2	0	1		K			S01	T04			Storage-Container/Treatment-Other
179	P	2	0	2		K			S01	T04			Storage-Container/Treatment-Other
180	P	2	0	3		K			S01	T04			Storage-Container/Treatment-Other
181	P	2	0	4		K			S01	T04			Storage-Container/Treatment-Other
182	P	2	0	5		K			S01	T04			Storage-Container/Treatment-Other
183	U	0	0	1		K			S01	T04			Storage-Container/Treatment-Other

Photocopy this page before completing if you have more than 26 wastes to list.

I.D. Number *(enter from page 1)*

W	A	7	8	9	0	0	0	8	9	6	7

IV. DESCRIPTION OF DANGEROUS WASTES *(continued)*

Line No.	A. Dangerous Waste No. *(enter code)*				B. Estimated Annual Quantity of Waste	C. Unit of Measure *(enter code)*			D. Processes				
									1. Process Codes *(enter)*				2. Process Description *(if a code is not entered in D(1))*
184	U	0	0	2		K			S01	T04			Storage-Container/Treatment-Other
185	U	0	0	3		K			S01	T04			Storage-Container/Treatment-Other
186	U	0	0	4		K			S01	T04			Storage-Container/Treatment-Other
187	U	0	0	5		K			S01	T04			Storage-Container/Treatment-Other
188	U	0	0	6		K			S01	T04			Storage-Container/Treatment-Other
189	U	0	0	7		K			S01	T04			Storage-Container/Treatment-Other
190	U	0	0	8		K			S01	T04			Storage-Container/Treatment-Other
191	U	0	0	9		K			S01	T04			Storage-Container/Treatment-Other
192	U	0	1	0		K			S01	T04			Storage-Container/Treatment-Other
193	U	0	1	1		K			S01	T04			Storage-Container/Treatment-Other
194	U	0	1	2		K			S01	T04			Storage-Container/Treatment-Other
195	U	0	1	4		K			S01	T04			Storage-Container/Treatment-Other
196	U	0	1	5		K			S01	T04			Storage-Container/Treatment-Other
197	U	0	1	6		K			S01	T04			Storage-Container/Treatment-Other
198	U	0	1	7		K			S01	T04			Storage-Container/Treatment-Other
199	U	0	1	8		K			S01	T04			Storage-Container/Treatment-Other
200	U	0	1	9		K			S01	T04			Storage-Container/Treatment-Other
201	U	0	2	0		K			S01	T04			Storage-Container/Treatment-Oth
202	U	0	2	1		K			S01	T04			Storage-Container/Treatment-Othe
203	U	0	2	2		K			S01	T04			Storage-Container/Treatment-Other
204	U	0	2	3		K			S01	T04			Storage-Container/Treatment-Other
205	U	0	2	4		K			S01	T04			Storage-Container/Treatment-Other
206	U	0	2	5		K			S01	T04			Storage-Container/Treatment-Other
207	U	0	2	6		K			S01	T04			Storage-Container/Treatment-Other
208	U	0	2	7		K			S01	T04			Storage-Container/Treatment-Other
209	U	0	2	8		K			S01	T04			Storage-Container/Treatment-Other
210	U	0	2	9		K			S01	T04			Storage-Container/Treatment-Other
211	U	0	3	0		K			S01	T04			Storage-Container/Treatment-Other
212	U	0	3	1		K			S01	T04			Storage-Container/Treatment-Other
213	U	0	3	2		K			S01	T04			Storage-Container/Treatment-Other
214	U	0	3	3		K			S01	T04			Storage-Container/Treatment-Other
215	U	0	3	4		K			S01	T04			Storage-Container/Treatment-Other
216	U	0	3	5		K			S01	T04			Storage-Container/Treatment-Other
217	U	0	3	6		K			S01	T04			Storage-Container/Treatment-Other
218	U	0	3	7		K			S01	T04			Storage-Container/Treatment-Other
219	U	0	3	8		K			S01	T04			Storage-Container/Treatment-Other
220	U	0	3	9		K			S01	T04			Storage-Container/Treatment-Other
221	U	0	4	1		K			S01	T04			Storage-Container/Treatment-Other
222	U	0	4	2		K			S01	T04			Storage-Container/Treatment-Other
223	U	0	4	3		K			S01	T04			Storage-Container/Treatment-Other
224	U	0	4	4		K			S01	T04			Storage-Container/Treatment-Other
225	U	0	4	5		K			S01	T04			Storage-Container/Treatment-Oth
226	U	0	4	6		K			S01	T04			Storage-Container/Treatment-Other
227	U	0	4	7		K			S01	T04			Storage-Container/Treatment-Other
228	U	0	4	8		K			S01	T04			Storage-Container/Treatment-Other
229	U	0	4	9		K			S01	T04			Storage-Container/Treatment-Other

Photocopy this page before completing if you have more than 26 wastes to list.

I.D. Number *(enter from page 1)*											
	A	7	8	9	0	0	0	8	9	6	7

IV. DESCRIPTION OF DANGEROUS WASTES *(continued)*

Line No.	A. Dangerous Waste No. *(enter code)*				B. Estimated Annual Quantity of Waste	C. Unit of Measure *(enter code)*			D. Processes 1. Process Codes *(enter)*				D. Processes 2. Process Description *(if a code is not entered in D(1))*
230	U	0	5	0		K			S01	T04			Storage-Container/Treatment-Other
231	U	0	5	1		K			S01	T04			Storage-Container/Treatment-Other
232	U	0	5	2		K			S01	T04			Storage-Container/Treatment-Other
233	U	0	5	3		K			S01	T04			Storage-Container/Treatment-Other
234	U	0	5	5		K			S01	T04			Storage-Container/Treatment-Other
235	U	0	5	6		K			S01	T04			Storage-Container/Treatment-Other
236	U	0	5	7		K			S01	T04			Storage-Container/Treatment-Other
237	U	0	5	8		K			S01	T04			Storage-Container/Treatment-Other
238	U	0	5	9		K			S01	T04			Storage-Container/Treatment-Other
239	U	0	6	0		K			S01	T04			Storage-Container/Treatment-Other
240	U	0	6	1		K			S01	T04			Storage-Container/Treatment-Other
241	U	0	6	2		K			S01	T04			Storage-Container/Treatment-Other
242	U	0	6	3		K			S01	T04			Storage-Container/Treatment-Other
243	U	0	6	4		K			S01	T04			Storage-Container/Treatment-Other
244	U	0	6	6		K			S01	T04			Storage-Container/Treatment-Other
245	U	0	6	7		K			S01	T04			Storage-Container/Treatment-Other
246	U	0	6	8		K			S01	T04			Storage-Container/Treatment-Other
247	U	0	6	9		K			S01	T04			Storage-Container/Treatment-Other
248	U	0	7	0		K			S01	T04			Storage-Container/Treatment-Other
249	U	0	7	1		K			S01	T04			Storage-Container/Treatment-Other
250	U	0	7	2		K			S01	T04			Storage-Container/Treatment-Other
251	U	0	7	3		K			S01	T04			Storage-Container/Treatment-Other
252	U	0	7	4		K			S01	T04			Storage-Container/Treatment-Other
253	U	0	7	5		K			S01	T04			Storage-Container/Treatment-Other
254	U	0	7	6		K			S01	T04			Storage-Container/Treatment-Other
255	U	0	7	7		K			S01	T04			Storage-Container/Treatment-Other
256	U	0	7	8		K			S01	T04			Storage-Container/Treatment-Other
257	U	0	7	9		K			S01	T04			Storage-Container/Treatment-Other
258	U	0	8	0		K			S01	T04			Storage-Container/Treatment-Other
259	U	0	8	1		K			S01	T04			Storage-Container/Treatment-Other
260	U	0	8	2		K			S01	T04			Storage-Container/Treatment-Other
261	U	0	8	3		K			S01	T04			Storage-Container/Treatment-Other
262	U	0	8	4		K			S01	T04			Storage-Container/Treatment-Other
263	U	0	8	5		K			S01	T04			Storage-Container/Treatment-Other
264	U	0	8	6		K			S01	T04			Storage-Container/Treatment-Other
265	U	0	8	7		K			S01	T04			Storage-Container/Treatment-Other
266	U	0	8	8		K			S01	T04			Storage-Container/Treatment-Other
267	U	0	8	9		K			S01	T04			Storage-Container/Treatment-Other
268	U	0	9	0		K			S01	T04			Storage-Container/Treatment-Other
269	U	0	9	1		K			S01	T04			Storage-Container/Treatment-Other
270	U	0	9	2		K			S01	T04			Storage-Container/Treatment-Other
271	U	0	9	3		K			S01	T04			Storage-Container/Treatment-Other
272	U	0	9	4		K			S01	T04			Storage-Container/Treatment-Other
273	U	0	9	5		K			S01	T04			Storage-Container/Treatment-Other
274	U	0	9	6		K			S01	T04			Storage-Container/Treatment-Other
275	U	0	9	7		K			S01	T04			Storage-Container/Treatment-Other

Photocopy this page before completing if you have more than 26 wastes to list.

I.D. Number *(enter from page 1)*											
W	A	7	8	9	0	0	0	8	9	6	7

IV. DESCRIPTION OF DANGEROUS WASTES *(continued)*

Line No.	A. Dangerous Waste No. *(enter code)*				B. Estimated Annual Quantity of Waste	C. Unit of Measure *(enter code)*			D. Processes 1. Process Codes *(enter)*				D. Processes 2. Process Description *(if a code is not entered in D(1))*
276	U	0	9	8		K			S01	T04			Storage-Container/Treatment-Other
277	U	0	9	9		K			S01	T04			Storage-Container/Treatment-Other
278	U	1	0	1		K			S01	T04			Storage-Container/Treatment-Other
279	U	1	0	2		K			S01	T04			Storage-Container/Treatment-Other
280	U	1	0	3		K			S01	T04			Storage-Container/Treatment-Other
281	U	1	0	5		K			S01	T04			Storage-Container/Treatment-Other
282	U	1	0	6		K			S01	T04			Storage-Container/Treatment-Other
283	U	1	0	7		K			S01	T04			Storage-Container/Treatment-Other
284	U	1	0	8		K			S01	T04			Storage-Container/Treatment-Other
285	U	1	0	9		K			S01	T04			Storage-Container/Treatment-Other
286	U	1	1	0		K			S01	T04			Storage-Container/Treatment-Other
287	U	1	1	1		K			S01	T04			Storage-Container/Treatment-Other
288	U	1	1	2		K			S01	T04			Storage-Container/Treatment-Other
289	U	1	1	3		K			S01	T04			Storage-Container/Treatment-Other
290	U	1	1	4		K			S01	T04			Storage-Container/Treatment-Other
291	U	1	1	5		K			S01	T04			Storage-Container/Treatment-Other
292	U	1	1	6		K			S01	T04			Storage-Container/Treatment-Other
293	U	1	1	7		K			S01	T04			Storage-Container/Treatment-Oth
294	U	1	1	8		K			S01	T04			Storage-Container/Treatment-Other
295	U	1	1	9		K			S01	T04			Storage-Container/Treatment-Other
296	U	1	2	0		K			S01	T04			Storage-Container/Treatment-Other
297	U	1	2	1		K			S01	T04			Storage-Container/Treatment-Other
298	U	1	2	2		K			S01	T04			Storage-Container/Treatment-Other
299	U	1	2	3		K			S01	T04			Storage-Container/Treatment-Other
300	U	1	2	4		K			S01	T04			Storage-Container/Treatment-Other
301	U	1	2	5		K			S01	T04			Storage-Container/Treatment-Other
302	U	1	2	6		K			S01	T04			Storage-Container/Treatment-Other
303	U	1	2	7		K			S01	T04			Storage-Container/Treatment-Other
304	U	1	2	8		K			S01	T04			Storage-Container/Treatment-Other
305	U	1	2	9		K			S01	T04			Storage-Container/Treatment-Other
306	U	1	3	0		K			S01	T04			Storage-Container/Treatment-Other
307	U	1	3	1		K			S01	T04			Storage-Container/Treatment-Other
308	U	1	3	2		K			S01	T04			Storage-Container/Treatment-Other
309	U	1	3	3		K			S01	T04			Storage-Container/Treatment-Other
310	U	1	3	4		K			S01	T04			Storage-Container/Treatment-Other
311	U	1	3	5		K			S01	T04			Storage-Container/Treatment-Other
312	U	1	3	6		K			S01	T04			Storage-Container/Treatment-Other
313	U	1	3	7		K			S01	T04			Storage-Container/Treatment-Other
314	U	1	3	8		K			S01	T04			Storage-Container/Treatment-Other
315	U	1	4	0		K			S01	T04			Storage-Container/Treatment-Other
316	U	1	4	1		K			S01	T04			Storage-Container/Treatment-Other
317	U	1	4	2		K			S01	T04			Storage-Container/Treatment-Oth
318	U	1	4	3		K			S01	T04			Storage-Container/Treatment-Other
319	U	1	4	4		K			S01	T04			Storage-Container/Treatment-Other
320	U	1	4	5		K			S01	T04			Storage-Container/Treatment-Other
321	U	1	4	6		K			S01	T04			Storage-Container/Treatment-Other

Photocopy this page before completing if you have more than 26 wastes to list.

I.D. Number *(enter from page 1)*												
	A	7	8	9	0	0	0	8	9	6	7	

IV. DESCRIPTION OF DANGEROUS WASTES *(continued)*

Line No.	A. Dangerous Waste No. *(enter code)*				B. Estimated Annual Quantity of Waste	C. Unit of Measure *(enter code)*			D. Processes 1. Process Codes *(enter)*				D. Processes 2. Process Description *(if a code is not entered in D(1))*
322	U	1	4	7		K			S01	T04			Storage-Container/Treatment-Other
323	U	1	4	8		K			S01	T04			Storage-Container/Treatment-Other
324	U	1	4	9		K			S01	T04			Storage-Container/Treatment-Other
325	U	1	5	0		K			S01	T04			Storage-Container/Treatment-Other
326	U	1	5	1		K			S01	T04			Storage-Container/Treatment-Other
327	U	1	5	2		K			S01	T04			Storage-Container/Treatment-Other
328	U	1	5	3		K			S01	T04			Storage-Container/Treatment-Other
329	U	1	5	4		K			S01	T04			Storage-Container/Treatment-Other
330	U	1	5	5		K			S01	T04			Storage-Container/Treatment-Other
331	U	1	5	6		K			S01	T04			Storage-Container/Treatment-Other
332	U	1	5	7		K			S01	T04			Storage-Container/Treatment-Other
333	U	1	5	8		K			S01	T04			Storage-Container/Treatment-Other
334	U	1	5	9		K			S01	T04			Storage-Container/Treatment-Other
335	U	1	6	0		K			S01	T04			Storage-Container/Treatment-Other
336	U	1	6	1		K			S01	T04			Storage-Container/Treatment-Other
337	U	1	6	2		K			S01	T04			Storage-Container/Treatment-Other
338	U	1	6	3		K			S01	T04			Storage-Container/Treatment-Other
339	U	1	6	4		K			S01	T04			Storage-Container/Treatment-Other
340	U	1	6	5		K			S01	T04			Storage-Container/Treatment-Other
341	U	1	6	6		K			S01	T04			Storage-Container/Treatment-Other
342	U	1	6	7		K			S01	T04			Storage-Container/Treatment-Other
343	U	1	6	8		K			S01	T04			Storage-Container/Treatment-Other
344	U	1	6	9		K			S01	T04			Storage-Container/Treatment-Other
345	U	1	7	0		K			S01	T04			Storage-Container/Treatment-Other
346	U	1	7	1		K			S01	T04			Storage-Container/Treatment-Other
347	U	1	7	2		K			S01	T04			Storage-Container/Treatment-Other
348	U	1	7	3		K			S01	T04			Storage-Container/Treatment-Other
349	U	1	7	4		K			S01	T04			Storage-Container/Treatment-Other
350	U	1	7	6		K			S01	T04			Storage-Container/Treatment-Other
351	U	1	7	7		K			S01	T04			Storage-Container/Treatment-Other
352	U	1	7	8		K			S01	T04			Storage-Container/Treatment-Other
353	U	1	7	9		K			S01	T04			Storage-Container/Treatment-Other
354	U	1	8	0		K			S01	T04			Storage-Container/Treatment-Other
355	U	1	8	1		K			S01	T04			Storage-Container/Treatment-Other
356	U	1	8	2		K			S01	T04			Storage-Container/Treatment-Other
357	U	1	8	3		K			S01	T04			Storage-Container/Treatment-Other
358	U	1	8	4		K			S01	T04			Storage-Container/Treatment-Other
359	U	1	8	5		K			S01	T04			Storage-Container/Treatment-Other
360	U	1	8	6		K			S01	T04			Storage-Container/Treatment-Other
361	U	1	8	7		K			S01	T04			Storage-Container/Treatment-Other
362	U	1	8	8		K			S01	T04			Storage-Container/Treatment-Other
363	U	1	8	9		K			S01	T04			Storage-Container/Treatment-Other
364	U	1	9	0		K			S01	T04			Storage-Container/Treatment-Other
365	U	1	9	1		K			S01	T04			Storage-Container/Treatment-Other
366	U	1	9	2		K			S01	T04			Storage-Container/Treatment-Other
367	U	1	9	3		K			S01	T04			Storage-Container/Treatment-Other

Photocopy this page before completing if you have more than 26 wastes to list.

I.D. Number *(enter from page 1)*
W A 7 8 9 0 0 0 8 9 6 7

IV. DESCRIPTION OF DANGEROUS WASTES *(continued)*

Line No.	A. Dangerous Waste No. *(enter code)*				B. Estimated Annual Quantity of Waste	C. Unit of Measure *(enter code)*			D. Processes 1. Process Codes *(enter)*				D. Processes 2. Process Description *(if a code is not entered in D(1))*
368	U	1	9	4		K			S01	T04			Storage-Container/Treatment-Other
369	U	1	9	6		K			S01	T04			Storage-Container/Treatment-Other
370	U	1	9	7		K			S01	T04			Storage-Container/Treatment-Other
371	U	2	0	0		K			S01	T04			Storage-Container/Treatment-Other
372	U	2	0	1		K			S01	T04			Storage-Container/Treatment-Other
373	U	2	0	2		K			S01	T04			Storage-Container/Treatment-Other
374	U	2	0	3		K			S01	T04			Storage-Container/Treatment-Other
375	U	2	0	4		K			S01	T04			Storage-Container/Treatment-Other
376	U	2	0	5		K			S01	T04			Storage-Container/Treatment-Other
377	U	2	0	6		K			S01	T04			Storage-Container/Treatment-Other
378	U	2	0	7		K			S01	T04			Storage-Container/Treatment-Other
379	U	2	0	8		K			S01	T04			Storage-Container/Treatment-Other
380	U	2	0	9		K			S01	T04			Storage-Container/Treatment-Other
381	U	2	1	0		K			S01	T04			Storage-Container/Treatment-Other
382	U	2	1	1		K			S01	T04			Storage-Container/Treatment-Other
383	U	2	1	3		K			S01	T04			Storage-Container/Treatment-Other
384	U	2	1	4		K			S01	T04			Storage-Container/Treatment-Other
385	U	2	1	5		K			S01	T04			Storage-Container/Treatment-Oth
386	U	2	1	6		K			S01	T04			Storage-Container/Treatment-Othe
387	U	2	1	7		K			S01	T04			Storage-Container/Treatment-Other
388	U	2	1	8		K			S01	T04			Storage-Container/Treatment-Other
389	U	2	1	9		K			S01	T04			Storage-Container/Treatment-Other
390	U	2	2	0		K			S01	T04			Storage-Container/Treatment-Other
391	U	2	2	1		K			S01	T04			Storage-Container/Treatment-Other
392	U	2	2	2		K			S01	T04			Storage-Container/Treatment-Other
393	U	2	2	3		K			S01	T04			Storage-Container/Treatment-Other
394	U	2	2	5		K			S01	T04			Storage-Container/Treatment-Other
395	U	2	2	6		K			S01	T04			Storage-Container/Treatment-Other
396	U	2	2	7		K			S01	T04			Storage-Container/Treatment-Other
397	U	2	2	8		K			S01	T04			Storage-Container/Treatment-Other
398	U	2	3	4		K			S01	T04			Storage-Container/Treatment-Other
399	U	2	3	5		K			S01	T04			Storage-Container/Treatment-Other
400	U	2	3	6		K			S01	T04			Storage-Container/Treatment-Other
401	U	2	3	7		K			S01	T04			Storage-Container/Treatment-Other
402	U	2	3	8		K			S01	T04			Storage-Container/Treatment-Other
403	U	2	3	9		K			S01	T04			Storage-Container/Treatment-Other
404	U	2	4	0		K			S01	T04			Storage-Container/Treatment-Other
405	U	2	4	3		K			S01	T04			Storage-Container/Treatment-Other
406	U	2	4	4		K			S01	T04			Storage-Container/Treatment-Other
407	U	2	4	6		K			S01	T04			Storage-Container/Treatment-Other
408	U	2	4	7		K			S01	T04			Storage-Container/Treatment-Other
409	U	2	4	8		K			S01	T04			Storage-Container/Treatment-Ot
410	U	2	4	9		K			S01	T04			Storage-Container/Treatment-Other
411	U	2	7	1		K			S01	T04			Storage-Container/Treatment-Other
412	U	2	7	7		K			S01	T04			Storage-Container/Treatment-Other
413	U	2	7	8		K			S01	T04			Storage-Container/Treatment-Other

Photocopy this page before completing if you have more than 26 wastes to list.

I.D. Number *(enter from page 1)*										
A	7	8	9	0	0	0	8	9	6	7

IV. DESCRIPTION OF DANGEROUS WASTES *(continued)*

Line No.	A. Dangerous Waste No. *(enter code)*				B. Estimated Annual Quantity of Waste	C. Unit of Measure *(enter code)*			D. Processes — 1. Process Codes *(enter)*				D. Processes — 2. Process Description *(if a code is not entered in D(1))*
414	U	2	7	9		K			S01	T04			Storage-Container/Treatment-Other
415	U	2	8	0		K			S01	T04			Storage-Container/Treatment-Other
416	U	3	2	8		K			S01	T04			Storage-Container/Treatment-Other
417	U	3	5	3		K			S01	T04			Storage-Container/Treatment-Other
418	U	3	5	9		K			S01	T04			Storage-Container/Treatment-Other
419	U	3	6	4		K			S01	T04			Storage-Container/Treatment-Other
420	U	3	6	5		K			S01	T04			Storage-Container/Treatment-Other
421	U	3	6	6		K			S01	T04			Storage-Container/Treatment-Other
422	U	3	6	7		K			S01	T04			Storage-Container/Treatment-Other
423	U	3	7	2		K			S01	T04			Storage-Container/Treatment-Other
424	U	3	7	3		K			S01	T04			Storage-Container/Treatment-Other
425	U	3	7	5		K			S01	T04			Storage-Container/Treatment-Other
426	U	3	7	6		K			S01	T04			Storage-Container/Treatment-Other
427	U	3	7	7		K			S01	T04			Storage-Container/Treatment-Other
428	U	3	7	8		K			S01	T04			Storage-Container/Treatment-Other
429	U	3	7	9		K			S01	T04			Storage-Container/Treatment-Other
430	U	3	8	1		K			S01	T04			Storage-Container/Treatment-Other
431	U	3	8	2		K			S01	T04			Storage-Container/Treatment-Other
432	U	3	8	3		K			S01	T04			Storage-Container/Treatment-Other
433	U	3	8	4		K			S01	T04			Storage-Container/Treatment-Other
434	U	3	8	5		K			S01	T04			Storage-Container/Treatment-Other
435	U	3	8	6		K			S01	T04			Storage-Container/Treatment-Other
436	U	3	8	7		K			S01	T04			Storage-Container/Treatment-Other
437	U	3	8	9		K			S01	T04			Storage-Container/Treatment-Other
438	U	3	9	0		K			S01	T04			Storage-Container/Treatment-Other
439	U	3	9	1		K			S01	T04			Storage-Container/Treatment-Other
440	U	3	9	2		K			S01	T04			Storage-Container/Treatment-Other
441	U	3	9	3		K			S01	T04			Storage-Container/Treatment-Other
442	U	3	9	4		K			S01	T04			Storage-Container/Treatment-Other
443	U	3	9	5		K			S01	T04			Storage-Container/Treatment-Other
444	U	3	9	6		K			S01	T04			Storage-Container/Treatment-Other
445	U	4	0	0		K			S01	T04			Storage-Container/Treatment-Other
446	U	4	0	1		K			S01	T04			Storage-Container/Treatment-Other
447	U	4	0	2		K			S01	T04			Storage-Container/Treatment-Other
448	U	4	0	3		K			S01	T04			Storage-Container/Treatment-Other
449	U	4	0	4		K			S01	T04			Storage-Container/Treatment-Other
450	U	4	0	7		K			S01	T04			Storage-Container/Treatment-Other
451	U	4	0	9		K			S01	T04			Storage-Container/Treatment-Other
452	U	4	1	0		K			S01	T04			Storage-Container/Treatment-Other
453	U	4	1	1		K			S01	T04			Storage-Container/Treatment-Other
454	W	T	0	1		K			S01	T04			Storage-Container/Treatment-Other
455	W	T	0	2		K			S01	T04			Storage-Container/Treatment-Other
456	W	P	0	1		K			S01	T04			Storage-Container/Treatment-Other
457	W	P	0	2		K			S01	T04			Storage-Container/Treatment-Other
458	W	P	0	3		K			S01	T04			Storage-Container/Treatment-Other
459	W	S	C	2		K			S01	T04			Storage-Container/Treatment-Other

Photocopy this page before completing if you have more than 26 wastes to list.

I.D. Number *(enter from page 1)*
W A 7 8 9 0 0 0 8 9 6 7

IV. DESCRIPTION OF DANGEROUS WASTES *(continued)*

Line No.	A. Dangerous Waste No. *(enter code)*				B. Estimated Annual Quantity of Waste	C. Unit of Measure *(enter code)*			D. Processes				
									1. Process Codes *(enter)*				2. Process Description *(if a code is not entered in D(1))*
460	D	0	0	1	10,000	K			S02	T01			Storage-Tank/Treatment-Tank
461	D	0	0	2		K			S02	T01			Storage-Tank/Treatment-Tank
462	D	0	0	3		K			S02	T01			Storage-Tank/Treatment-Tank
463	D	0	0	4		K			S02	T01			Storage-Tank/Treatment-Tank
464	D	0	0	5		K			S02	T01			Storage-Tank/Treatment-Tank
465	D	0	0	6		K			S02	T01			Storage-Tank/Treatment-Tank
466	D	0	0	7		K			S02	T01			Storage-Tank/Treatment-Tank
467	D	0	0	8		K			S02	T01			Storage-Tank/Treatment-Tank
468	D	0	0	9		K			S02	T01			Storage-Tank/Treatment-Tank
469	D	0	1	0		K			S02	T01			Storage-Tank/Treatment-Tank
470	D	0	1	1		K			S02	T01			Storage-Tank/Treatment-Tank
471	D	0	1	8		K			S02	T01			Storage-Tank/Treatment-Tank
472	D	0	1	9		K			S02	T01			Storage-Tank/Treatment-Tank
473	D	0	2	2		K			S02	T01			Storage-Tank/Treatment-Tank
474	D	0	2	8		K			S02	T01			Storage-Tank/Treatment-Tank
475	D	0	2	9		K			S02	T01			Storage-Tank/Treatment-Tank
476	D	0	3	0		K			S02	T01			Storage-Tank/Treatment-Tank
477	D	0	3	3		K			S02	T01			Storage-Tank/Treatment-Tank
478	D	0	3	4		K			S02	T01			Storage-Tank/Treatment-Tank
479	D	0	3	5		K			S02	T01			Storage-Tank/Treatment-Tank
480	D	0	3	6		K			S02	T01			Storage-Tank/Treatment-Tank
481	D	0	3	8		K			S02	T01			Storage-Tank/Treatment-Tank
482	D	0	3	9		K			S02	T01			Storage-Tank/Treatment-Tank
483	D	0	4	0		K			S02	T01			Storage-Tank/Treatment-Tank
484	D	0	4	1		K			S02	T01			Storage-Tank/Treatment-Tank
485	D	0	4	3		K			S02	T01			Storage-Tank/Treatment-Tank
486	W	T	0	1		K			S02	T01			Storage-Tank/Treatment-Tank
487	W	T	0	2		K			S02	T01			Storage-Tank/Treatment-Tank
488	W	P	0	1		K			S02	T01			Storage-Tank/Treatment-Tank
489	W	P	0	2		K			S02	T01			Storage-Tank/Treatment-Tank
490	W	S	C	2		K			S02	T01			Storage-Tank/Treatment-Tank
491	F	0	0	1		K			S02	T01			Storage-Tank/Treatment-Tank
492	F	0	0	2		K			S02	T01			Storage-Tank/Treatment-Tank
493	F	0	0	3		K			S02	T01			Storage-Tank/Treatment-Tank
494	F	0	0	4		K			S02	T01			Storage-Tank/Treatment-Tank
495	F	0	0	5		K			S02	T01			Storage-Tank/Treatment-Tank
496	F	0	3	9		K			S02	T01			Storage-Tank/Treatment-Tank

IV. DESCRIPTION OF DANGEROUS WASTE (continued)

Use this space to list additional process codes from Section D(1) on page 3.

Routine dangerous and/or mixed waste treatment that will be conducted in the 325 HWTUs will include pH adjustment, ion exchange, carbon absorption, oxidation, reduction, waste concentration by evaporation, precipitation, filtration, solvent extraction, solids washing, phase separation, catalytic destruction, and solidification/stabilization. These waste treatments will be conducted on small quantities of diverse radioactive, dangerous, and/or mixed wastes generated from ongoing research and development and analytical chemistry activities. Waste to be handled in the 325 HWTUs will include listed waste, waste from non-specific sources, characteristic waste, and state-only criteria waste. Multi-source leachate (F039) is included as a waste derived from non-specific source waste F001 through F005.

V. FACILIITY DRAWING Refer to attached drawing(s).

All existing facilities must include in the space provided on page 5 a scale drawing of the facility (see instructions for more detail).

VI. PHOTOGRAPHS Refer to attached photograph(s).

All existing facilities must include photographs (aerial or ground-level) that clearly delineate all existing structures; existing storage, treatment and disposal areas; and sites of future storage, treatment or disposal areas (see instructions for more detail).

II. FACILITY GEOGRAPHIC LOCATION This information is provided on the attached drawings and photos.

LATITUDE *(degrees, minutes, & seconds)*	LONGITUDE *(degrees, minutes, & seconds)*

VIII. FACILITY OWNER

☒ A. If the facility owner is also the facility operator as listed in Section VII on Form 1, "General Information," place an "X" in the box to the left and skip to Section XI below.

B. If the facility owner is not the facility operator as listed in Section VII on Form 1, complete the following items:

1. Name of Facility's Legal Owner	2. Phone Number *(area code & no.)*

3. Street or P.O. Box	4. City or Town	5. St.	6. Zip Code

IX. OWNER CERTIFICATION

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this and all attached documents, and that based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the submitted information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

Name *(print or type)*	Signature	Date Signed
Lloyd L. Piper, Acting Manager U.S. Department of Energy Richland Operations Office	L.L/ Piper	Revision 4 signed 06/30/1997

X. OPERATOR CERTIFICATION

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this and all attached documents, and that based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the submitted information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

Name *(Print Or Type)*	Signature	Date Signed
See attachment		

X. OPERATOR CERTIFICATION

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this and all attached documents, and that based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the submitted information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

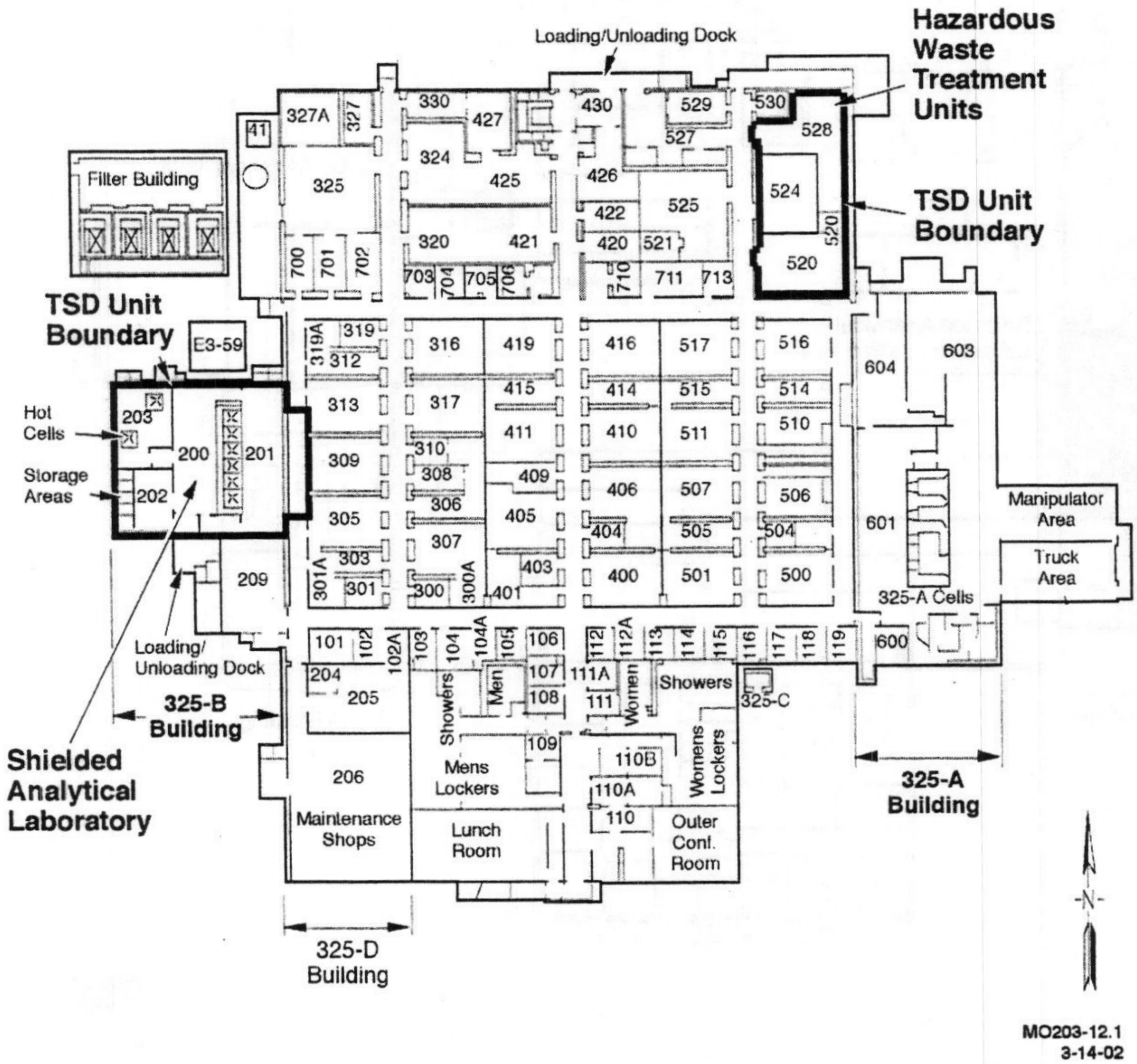
L. L. Piper
Owner/Operator
Lloyd L. Piper, Acting Manager
U.S. Department of Energy
Richland Operations Office

6/30/97
Date Revision 4 Signed

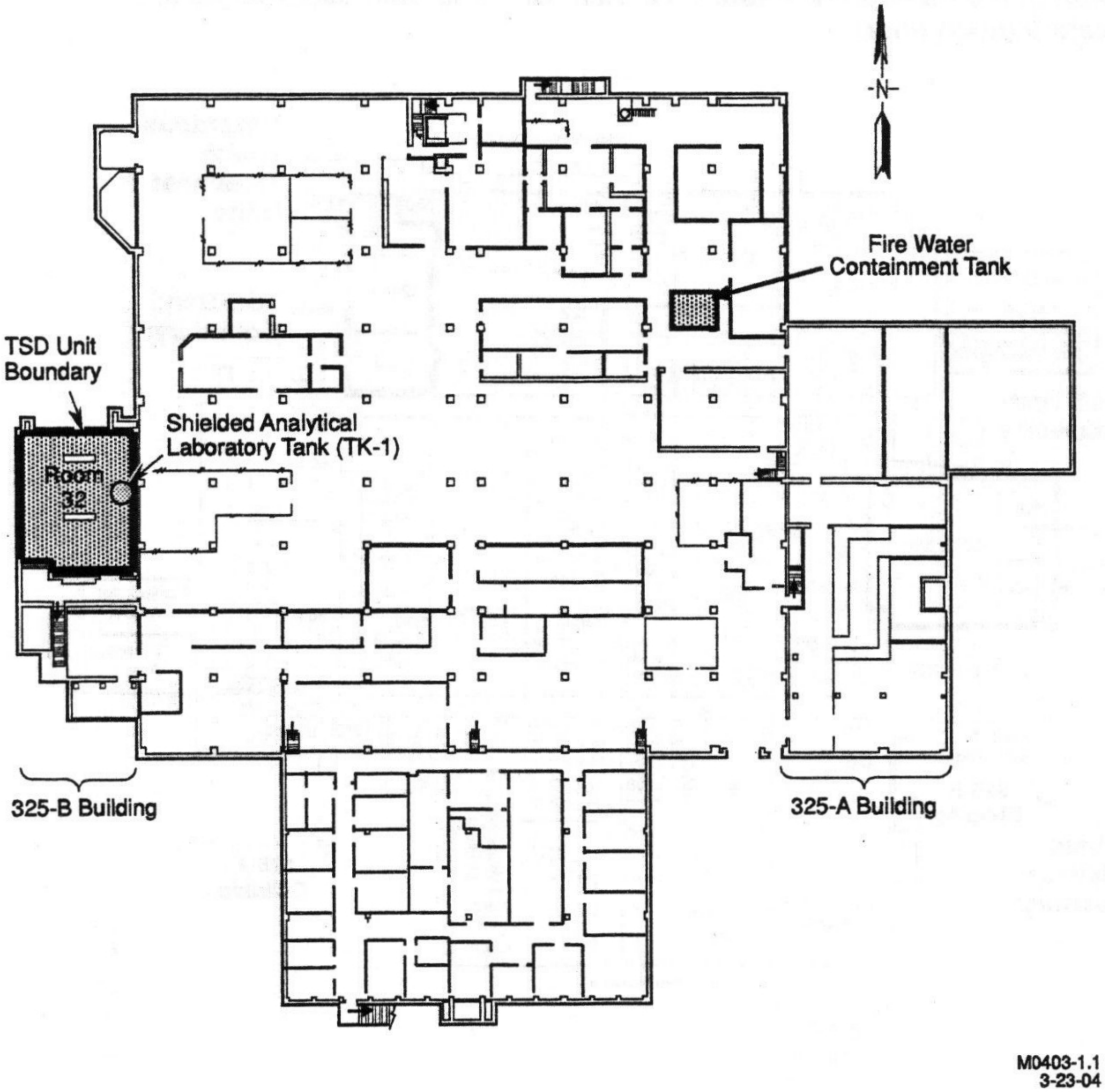
William J. Madia
Co-Operator
William J. Madia, Director
Pacific Northwest national Laboratory

6/26/97
Date Revision 4 Signed

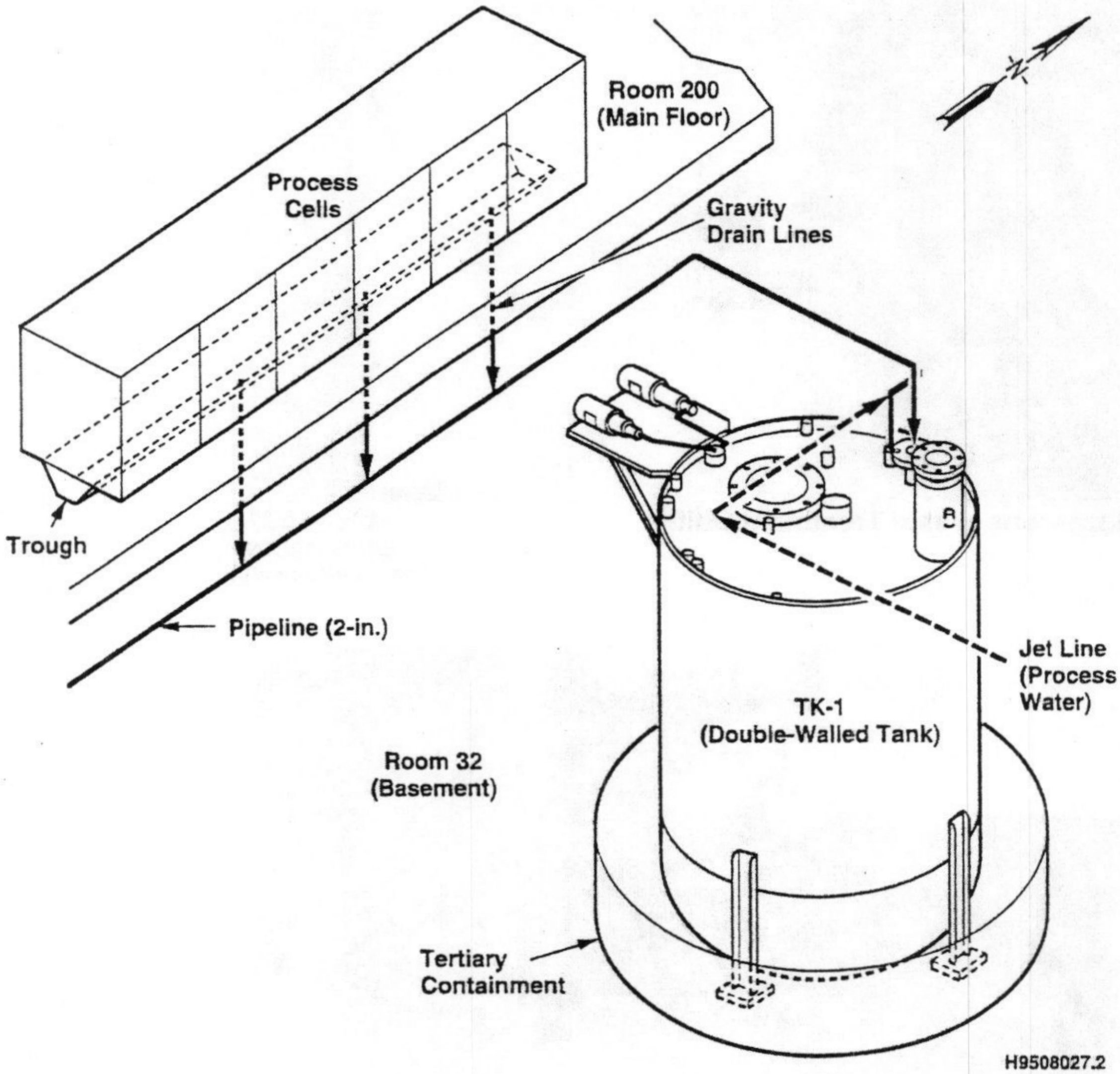
Location of the Hazardous Waste Treatment Unit and Shielded Analytical Laboratory (main floor)

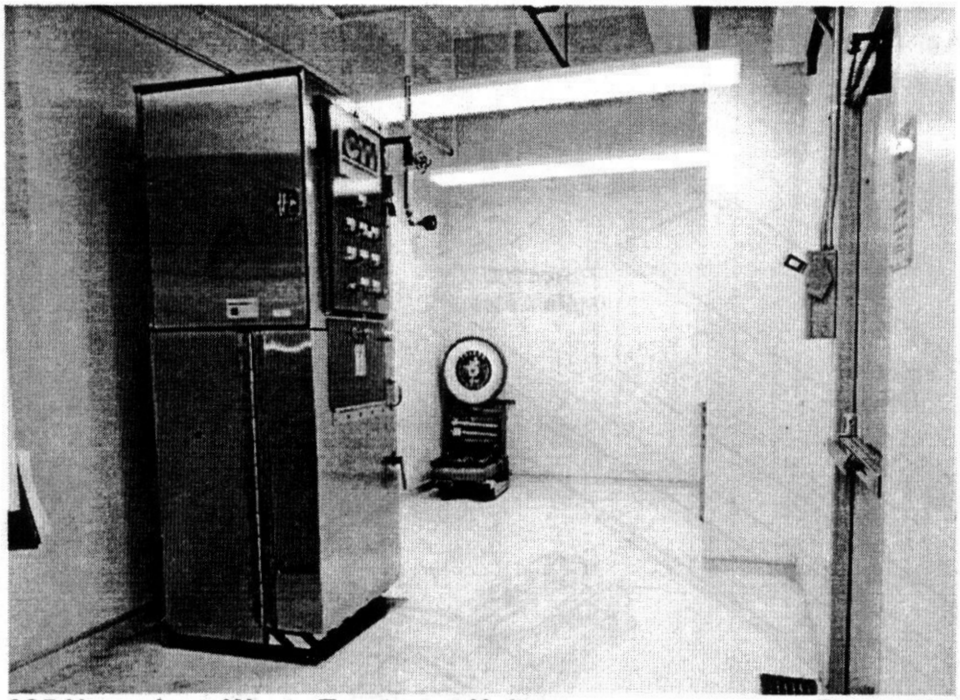


Location of Shielded Analytical Laboratory Tank in Room 32

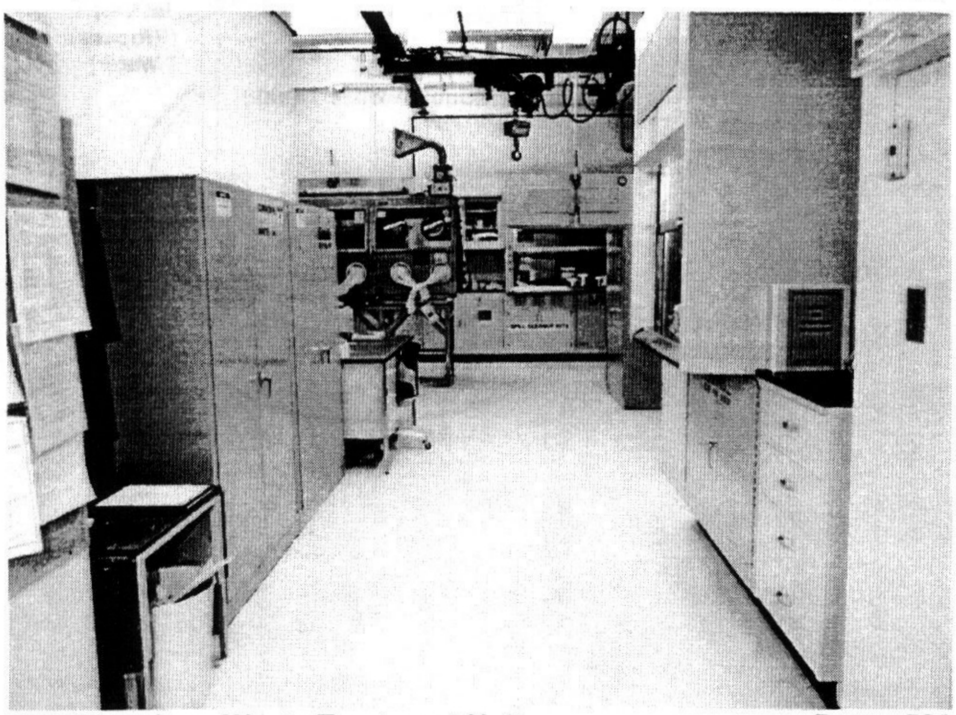


Shielded Analytical Laboratory Tank and Ancillary Piping

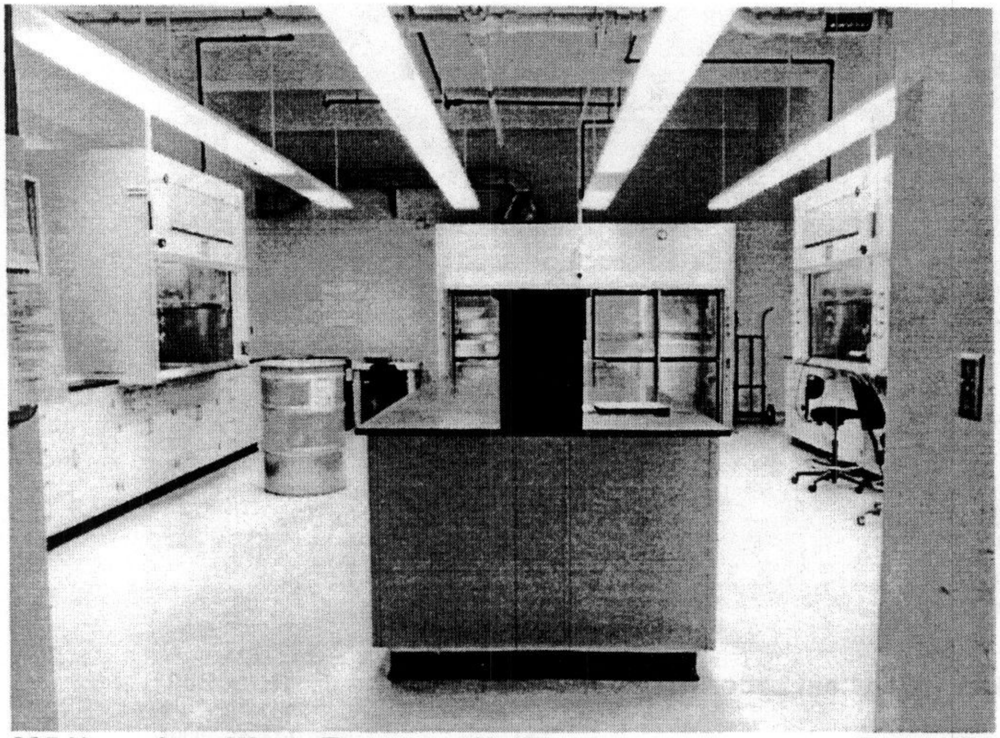




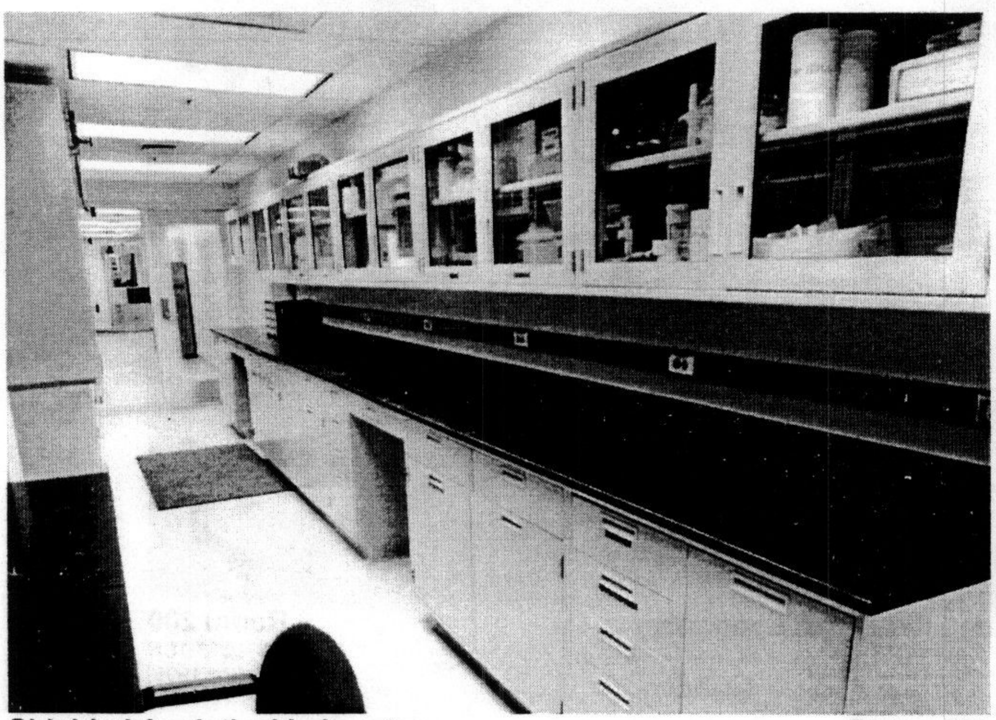
325 Hazardous Waste Treatment Units **Room 528**
96010398-22CN
(Photo Taken 1996)



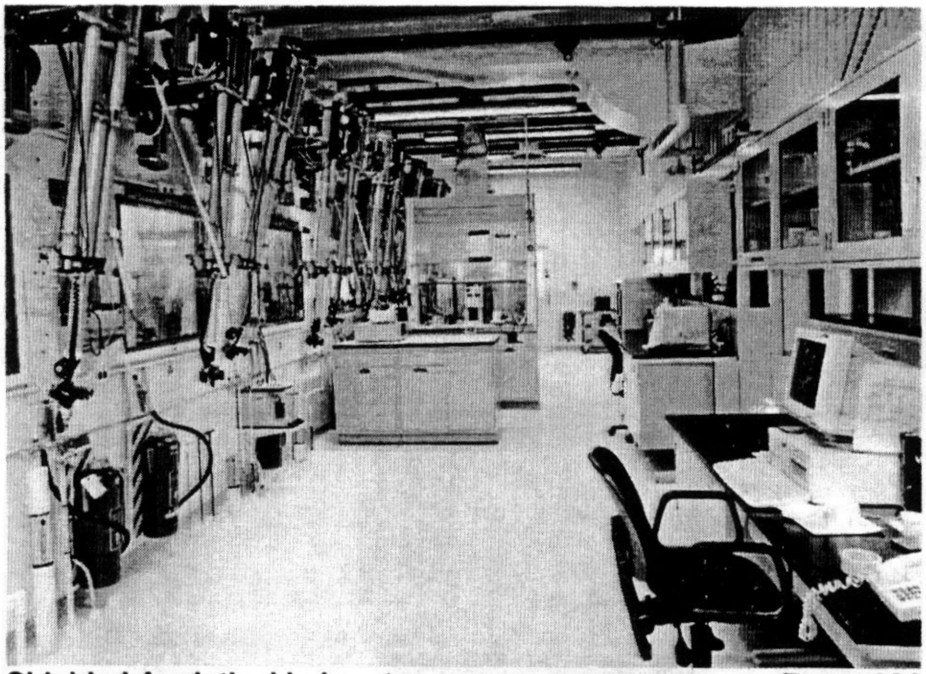
325 Hazardous Waste Treatment Units **Room 528**
96010398-20CN
(Photo Taken 1996)



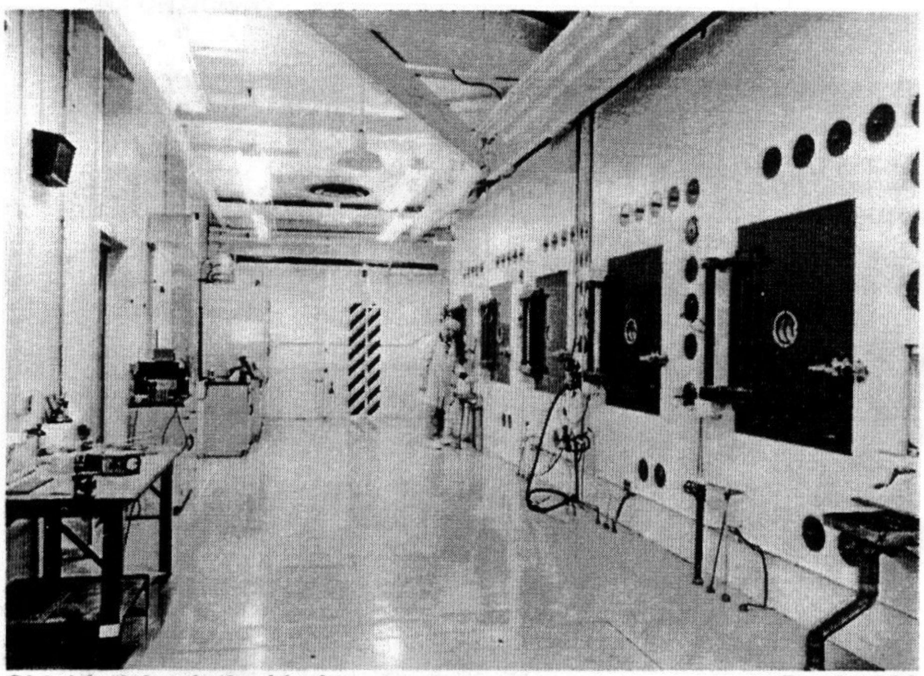
325 Hazardous Waste Treatment Units **Room 520**
96010398-17CN
(Photo Taken 1996)



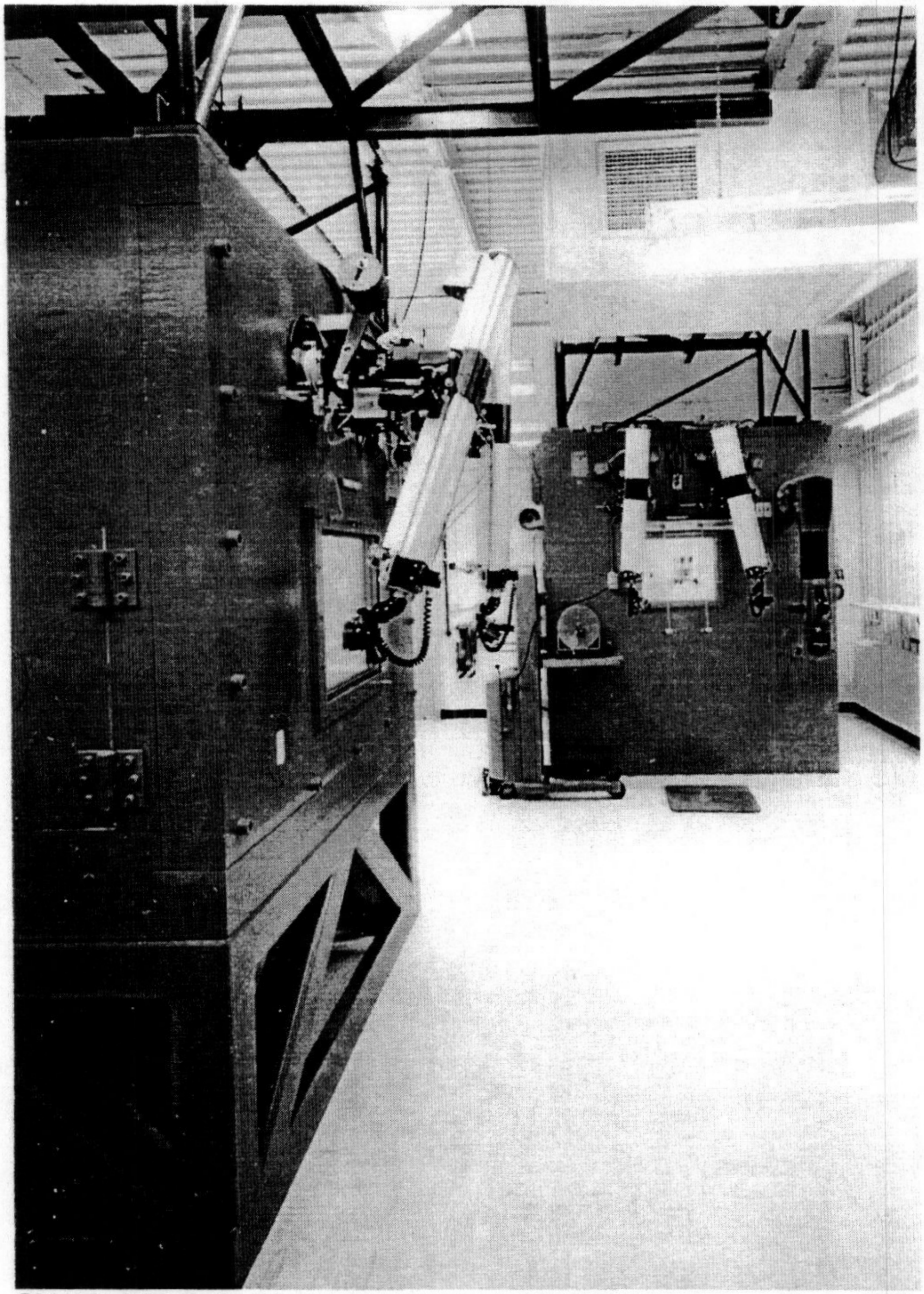
Shielded Analytical Laboratory **Room 201**
96010398-16CN
(Photo Taken 1996)



Shielded Analytical Laboratory **Room 201**
96010398-7CN
(Photo Taken 1996)

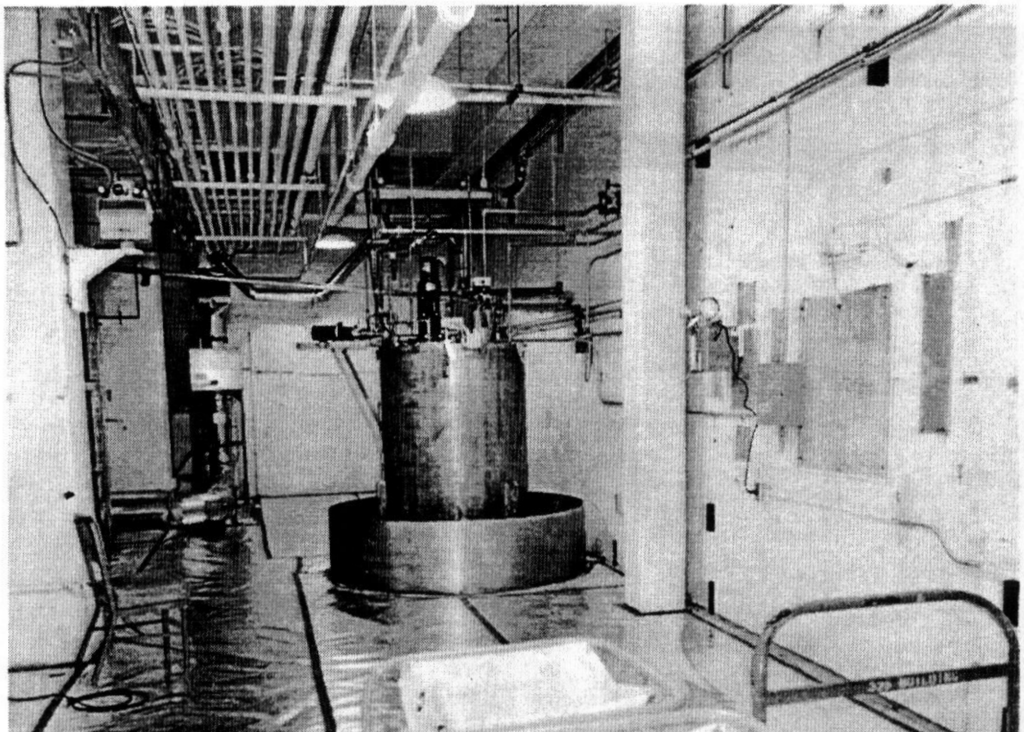


Shielded Analytical Laboratory **Room 200**
96010398-1CN
(Photo Taken 1996)



Shielded Analytical Laboratory

Room 203
7908247-1CN
(Photo Taken 1979)



Shielded Analytical Laboratory

SAL Tank
96010398-3CN
(Photo Taken 1996)

Content

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2.0 FACILITY DESCRIPTION AND GENERAL PROVISIONS

2.1 TOPOGRAPHIC MAP

Topographic map, H-13-000197, shows a distance of at least 305 meters around the 325 HWTUs. The map contains the following information:

- Map scale
- Date
- Prevailing wind speed
- Sewer systems
- Loading/unloading areas
- Fire control
- Access road location
- Access control
- 100-year flood plain
- Injection and withdrawal wells and direction
- A north arrow
- Surrounding land use
- Buildings

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Contents

Figures

Tables

GLOSSARY

325 HWTUs	325 Hazardous Waste Treatment Units consists of the HWTU, SAL, and RLWS tank system subunits)
AA	atomic absorption
ALARA	as low as reasonably achievable
API	American Petroleum Institute
ASTM	American Society for Testing and Materials
BED	Building Emergency Director
CFR	Code of Federal Regulations
COLIWASA	Composite Liquid-Waste Sampler
DOE	U.S. Department of Energy
DOE-RL	U.S. Department of Energy, Richland Operations Office
DOT	U.S. Department of Transportation
Ecology	Washington State Department of Ecology
EPA	U.S. Environmental Protection Agency
g	gram
gal	gallon
GC/MS	gas chromatography/mass spectroscopy
h	hour
HWTU	Hazardous Waste Treatment Unit
ICP	inductively coupled plasma
in.	inch
kg	kilogram
LDR	land-disposal restriction
MSDS	material safety data sheet
NFPA	National Fire Protection Association
OSHA	Occupational Safety and Health Administration
PCB	polychlorinated biphenyl
PNL	Pacific Northwest Laboratory
PNNL	Pacific Northwest National Laboratory (PNL, above, was renamed to Pacific Northwest National Laboratory in October 1995)
psf	pounds per square foot
QA	quality assurance
QC	quality control
RCRA	Resource Conservation and Recovery Act
RCW	Revised Code of Washington
SAL	Shielded Analytical Laboratory
TCLP	toxicity characteristic leaching procedure
TSD	treatment, storage, and disposal
UFC	Uniform Fire Code
WAC	Washington Administrative Code

Acceptable Knowledge
Information collected by the generator to meet waste-management requirements and determined to be adequate by the TSD unit. According to EPA, the generator may use process knowledge, waste-analysis data, and records of analysis performed before the effective date of regulation. Process knowledge is acceptable for assigning appropriate waste codes.

Analysis
The process that the generator completes to characterize the waste properly. This analysis must provide the information necessary to manage the waste in accordance with the requirements of WAC 173-303. The analysis may include or consist of a review of existing published or documented data on the dangerous waste, or on waste generated from similar processes, or data obtained by testing, if necessary. The information must include detailed information pertaining to the chemical, physical, and/or biological nature of a dangerous waste, or nondangerous wastes if applicable under WAC 173-303-610(4)(d) [WAC 173-303-300(2)].

Bulk Waste Stream
Large volumes of homogeneous waste from a single generating event, e.g., soil remediation from a single location.

Certification
See Land Disposal Restrictions LDR Certification

Characterize (characterization)
The steps the generator or TSD unit takes to describe the contents of the waste to ensure proper management adequately and accurately. This characterization information is required to provide for compliant treatment, storage, or disposal of a dangerous waste and includes waste designation, TSD unit waste-acceptance criteria, or land-disposal restriction information (to facilitate discussions on characterization, we use the terms characterize for storage, characterize for treatment, or characterize for disposal).

Characterize for Disposal
The minimum information required to demonstrate that a waste was not LDR or no longer LDR. This information consists of analytical data as described in the federal regulations (i.e., 40 CFR 268), which demonstrate the waste meets any concentration-based standards. To demonstrate that a specified technology was used to meet federal treatment standards (i.e., 40 CFR 268.42 or 268.45), acceptable knowledge must be obtained from the customer or by the disposal unit. For state-only land-disposal restrictions, the disposal unit will either test the waste, use process knowledge, or the two to confirm that the customer properly treated the waste, if applicable, to state land disposal restriction standards. Information must also be provided to demonstrate that the waste meets the operational parameters of the disposal facility, such as liner compatibility information.

Characterize for Storage
At a minimum, the information necessary to manage the waste appropriately at a TSD storage unit. Acceptable knowledge may be required for any operational parameters of the TSD unit, TSCA information (i.e., regulated for PCBs), and characteristics which may present a management concern (i.e., waste regulated for ignitability, corrosivity, and/or reactivity).

Characterize for Treatment
The minimum information for a waste to be shipped to a treatment unit and successfully treated. This includes a complete designation, land-disposal restriction determination information including underlying hazardous constituent information (if applicable), and treatment unit operational parameters.

Confirm (confirmation)
The confirmation process includes completing appropriate pre-shipment review and verification steps and/or parameters. The requirement to confirm appears twice in WAC 173-303-300 and applies to two different scenarios.

Scenario 1: The process that an owner or operator uses to ensure knowledge supplied by the generator or TSD unit is acceptable knowledge to ensure that the waste is managed properly [WAC 173-303-300(1)].

Scenario 2: The process that a facility owner or operator receiving off-site facility shipments uses to determine, by analysis if necessary, that each waste received at the facility matches the identity of the waste specified on the accompanying manifest or shipping paper [WAC 173-303-300(3)].

Conformance Issue
Any issue, which, if left unresolved, prevents acceptance of waste. This includes manifest discrepancies and inconsistencies.

Container Failure
A waste container for which a manifest discrepancy has been identified.

Container Receipt Inspection
The process a TSD unit uses to examine an incoming container and will include, but is not limited to, inspecting labels, checking the condition of the container, checking the piece count of the shipment, and checking the shipping papers associated with the container.

Corroborative Testing
Sampling and analysis performed by both the treater and disposer of an LDR waste to meet federal land-disposal restriction concentration-based treatment standards. The frequency of testing is determined on a case-by-case basis by the permit writer, 55 FR 22669.

Customer
The generator or TSD unit who ships waste to another TSD unit, the current custodian of the waste.

Designation
The process of determining if a solid waste is a mixed waste, resulting in the assignment of proper federal and state waste codes.

Disposal Unit
A TSD unit on the Hanford Facility permitted to dispose of mixed waste that meets all applicable state-only and federal land disposal restrictions (i.e., Low-Level Burial Grounds).

Effective Date of Regulation
The date when mixed waste became subject to regulation in Washington State (August 19, 1987).

Equivalent Test Method
A laboratory or field-testing method used to determine characteristics or composition of a waste that has been approved by Ecology in accordance with WAC 173-303 rule-making procedures, in lieu of using a laboratory- or field-testing method required by regulation. A generator or owner/operator must submit a rule-making petition to Ecology in accordance with WAC 173-303-110(5) and WAC 173-303-910(2).

Facility
All contiguous land, structures, other appurtenances, and improvements on the land used for recycling, reusing, reclaiming, transferring, storing, treating, or disposing of dangerous waste. The legal and physical description of the Hanford Facility is set forth in Attachment 2 of the Hanford Facility RCRA permit.

Fingerprint Analysis
Sampling and analysis of several key chemical and physical parameters of a waste to substantiate or verify the composition of a waste as determined previously during characterization. Fingerprint analysis typically is used by generators to substantiate waste characterization of frequently generated wastes. TSD units may use fingerprint analysis for verification. Parameters for sampling and analysis may be a subset of the parameters used during characterization, or they may be parameters that are not normally present in the waste to verify the absence of certain constituents.

General Waste Stream
Waste from a single customer and Waste-Management Group.

Generator
Any person, by site, whose act or process produces dangerous waste or whose act first causes a dangerous waste to become subject to regulation, WAC 173-303-040. The generator on the Hanford Facility is the U.S. Department of Energy Richland Operations Office and its contractors. A generator may accumulate (store or treat) a dangerous waste under the provisions in WAC 173-303-170 and -200.

Hanford Facility
See Facility.

Inconsistencies
Any other discrepancies which are not manifest discrepancies.

Independent Authorized Agent
A group or organization that is functionally independent from the waste-generating function.

Land-Disposal Restrictions (federal)
Federal requirements pertaining to dangerous wastes designated under 40 CFR Part 261 that were generated on or after the effective date of regulation. State-only dangerous wastes are not subject to the federal LDR requirements.

Land-Disposal Restrictions (state-only)
State-only mixed-waste requirements pertaining to dangerous waste designated solely under WAC 173-303 and not 40 CFR 261 that were generated on or after the effective date of regulation.

LDR Certification
A written statement of professional opinion and intent signed by an authorized representative that acknowledges an owner's or operator's and/or generator's compliance with applicable LDR requirements.

Manifest Discrepancy
Significant discrepancies between the quantity or type of the dangerous waste designated on the manifest or shipping paper and the quantity or type of dangerous waste a facility actually receives, WAC 173-303-370(4)(a).

Pre-Shipment Review
The process used by the TSD unit to obtain and evaluate the generator's analysis of waste to be received by the TSD unit and to document acceptable knowledge on the waste profile.

Process Knowledge
Knowledge the generator applies to a solid waste to determine if it is a dangerous waste in light of the materials or the process used when such knowledge can be demonstrated to be sufficient for determining whether a solid waste is designated properly, WAC 173-303-070(3)(c)(ii). Process knowledge includes information on wastes obtained from existing published or documented waste-analysis data or studies conducted on mixed wastes generated by processes similar to that which generated the waste. Process knowledge for dangerous waste may also include information obtained from surrogate material.

QA/QC
Quality assurance (QA) is the process for ensuring that all data and the decisions based on that data are technically sound, statistically valid, and properly documented. Quality control (QC) procedures are the tools employed to measure the degree to which these quality-assurance objectives are fulfilled.

Re-Characterization
A process which occurs when an unsafe condition arises and/or when a waste is removed from a storage unit to meet acceptance criteria for the receiving treatment unit or disposal unit.

Repeat and Review Frequency
The frequency specified in a WAP on a TSD-unit basis that the owner/operator will ensure the knowledge maintained on a specific waste stream is still acceptable knowledge and/or adequate analysis. Repeat and review frequency provisions do not apply to corroborative testing.

Sampling and Analysis (Sampling and Laboratory Analysis)
The process of obtaining a representative sample(s) from a dangerous waste to determine the accuracy of characteristics or composition of the sample through laboratory or field testing.

Shipment Failure
A maximum of two container failures within the first verification sample set or combined first and second verification sample set. If only one container fails, it is considered an anomaly and corrected. It is understood that if the shipment consists of one or two drums, the shipment fails if one drum fails verification.

Significant Discrepancy
A discrepancy with regard to a manifest or shipping paper means a discrepancy between the quantity or type of dangerous waste designated on the manifest or shipping paper and the quantity or type of dangerous waste a TSD unit actually receives. A significant discrepancy in quantity is a variation greater than ten (10) percent in weight for bulk quantities (e.g., tanker trucks, railroad tank cars, etc.) or any variation in piece count for nonbulk quantities (i.e., any missing container or package would be a significant discrepancy). A significant discrepancy in type is an obvious physical or chemical difference which can be discovered by inspection or waste analysis (e.g., waste solvent substituted for waste acid. This also includes a discrepancy in the number of inner containers in a labpack.

Storage Unit
A TSD unit on the Hanford Facility permitted to store dangerous waste.

Treatment Unit
A TSD unit on the Hanford Facility permitted to treat dangerous waste.

TSD Unit
See Unit.

Unit

The term unit (or TSD unit), as used in Parts I through VI of the Hanford Facility RCRA permit, means the contiguous area of land on or in which dangerous waste is placed, or the largest area where there is a significant likelihood of mixing dangerous-waste constituents in the same area. A TSD unit, for the purposes of this Permit, is a subgroup of the Facility which has been identified in the Hanford Facility Dangerous Waste Part A.

Verify (Verification)

An assessment the receiving TSD unit performs to substantiate the analysis acquired by the TSD unit before acceptance. Verification must be performed by TSD unit personnel or an authorized agent on wastes received by the TSD unit. Verification may occur at the receiving TSD unit or at the generator's location, depending on many dangerous-waste shipment and packaging configuration factors. Verification activities include container receipt inspection, and as applicable, physical screening, and/or chemical screening/fingerprint analysis.

Waste-Acceptance Criteria

The minimum requirements imposed by a TSD unit to ensure that a dangerous waste is managed properly.

Waste Analysis

See Analysis.

Waste Profile

A mechanism used by the receiving TSD unit to document the generator's acceptable knowledge to meet the owner or operator's analysis obligation in WAC 173-303-300(2). Example forms or documents typically used by the TSD unit to maintain analysis information are included in the WAP as attachments. For offsite facilities, the waste profile will include the waste analysis which dangerous-waste generators have agreed to supply in accordance with WAC 173-303-300(5)(g).

Waste Stream

Per or each waste stream refers to individual waste streams, each with an individual point of generation. Individual waste streams include wastes that are physically or chemically different from each other; wastes that are generated from different types of processes; and wastes that are the same type, but are generated at different points along the same process or at different process locations. For information, the Hanford Facility uses the following factors in determining a waste stream: (1) the Department of Transportation requirements pertaining to the waste materials; (2) the waste designation of the waste materials; (3) the order of events pertaining to the process which generates the waste materials, (4) impermissible dilution concerns based on WAC 173-303-150 and 40 CFR 268.3; and (5) any future treatment- and disposal-management pathways available to the waste materials.

METRIC CONVERSION CHART

The following conversion chart is provided to the reader as a tool to aid in conversion.

If you know	Multiply by	to get	If you know	Multiply by	to get
Length			Length		
Inches	25.40	Millimeters	Millimeters	0.0393	inches
Inches	2.54	Centimeters	Centimeters	0.393	inches
Feet	0.3048	Meters	Meters	3.2808	feet
Yards	0.914	Meters	Meters	1.09	yards
Miles	1.609	Kilometers	Kilometers	0.62	miles
Area			Area		
Square inches	6.4516	square centimeters	square centimeters	0.155	square inches
Square feet	0.092	square meters	square meters	10.7639	square feet
Square yards	0.836	square meters	square meters	1.20	square yards
Square miles	2.59	square kilometers	square kilometers	0.39	square miles
Acres	0.404	Hectares	Hectares	2.471	acres
Mass (weight)			Mass (weight)		
Ounces	28.35	Grams	Grams	0.0352	ounces
Pounds	0.453	Kilograms	Kilograms	2.2046	pounds
short ton	0.907	metric ton	metric ton	1.10	short ton
Volume			Volume		
fluid ounces	29.57	Milliliters	Milliliters	0.03	fluid ounces
Quarts	0.95	Liters	Liters	1.057	quarts
Gallons	3.79	Liters	Liters	0.26	gallons
cubic feet	0.03	Cubic meters	cubic meters	35.3147	cubic feet
cubic yards	0.76	Cubic meters	cubic meters	1.308	cubic yards
Temperature			Temperature		
Fahrenheit	subtract 32 then multiply by 5/9ths	Celsius	Celsius	multiply by 9/5ths, then add 32	Fahrenheit

Source: *Engineering Unit Conversions*, M. R. Lindeburg, PE, Second Ed., 1990, Professional Publications, Inc., Belmont, California.

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3.0 WASTE ANALYSIS PLAN

This chapter provides information on the chemical, biological, and physical characteristics of the waste treated and stored in the 325 HWTUs, including waste descriptions, designations, and a waste-analysis plan.

3.1 CHEMICAL, BIOLOGICAL, AND PHYSICAL ANALYSIS

The dangerous waste managed at the 325 HWTUs can be categorized as originating from the following general sources:

- listed waste from specific and nonspecific sources
- laboratory waste resulting from analysis of samples
- discarded commercial chemical products
- hazardous or mixed waste from chemicals synthesized or created in research activities using radioactive isotopes
- discarded commercial chemical products exhibiting dangerous-waste characteristics and/or criteria.

Each of these waste categories is discussed in the following sections, including waste descriptions, hazard characteristics, and basis for hazard designations. This information includes data that must be known to treat, store, or dispose of the waste as required under WAC 173-303-806(4)(a)(ii).

3.1.1 Listed Waste from Specific and Nonspecific Sources

Waste from specific and nonspecific sources consists of listed waste identified in WAC 173-303-9904. Attachment 36, Chapter 1.0, for the 325 HWTUs identifies the following waste from this category:

- F001 – Spent halogenated degreasing solvents and sludges
- F002 – Spent halogenated solvents and still bottoms
- F003 – Spent nonhalogenated solvents and still bottoms
- F004 – Spent nonhalogenated solvents and still bottoms
- F005 – Spent nonhalogenated solvents and still bottoms
- F006 – Wastewater-treatment sludges from electroplating operations
- F007 – Spent cyanide-plating-bath solutions from electroplating operations
- F009 – Spent stripping- and cleaning-bath solutions from electroplating operations where cyanides are used in the process
- F027 – Discarded polychlorinated phenol formulations
- F039 – Leachate resulting from the disposal of more than one restricted waste classified as hazardous
- K011 – Bottom stream from the wastewater stripper in the production of acrylonitrile
- K013 – Bottom stream from acrylonitrile column in the production of acrylonitrile
- K048 – Dissolved air flotation (DAF) float from petroleum-refining industry
- K049 – Slop oil-emulsion solids from the petroleum-refining industry
- K050 – Heat exchange, bundle-cleaning sludge from petroleum-refining industry
- K051 – American Petroleum Institute separator sludge from the petroleum-refining industry
- K052 – Tank bottoms (leaded) from the petroleum-refining industry.

These halogenated and nonhalogenated solvents are in the form of spent solvents; no still bottoms are managed. Degreasing solvents (F001) as well as spent halogenated solvents (F002) are generated primarily in research and analytical processes. Spent nonhalogenated solvents (F003, F004, and F005) also come primarily from research laboratories. Much of the waste to be treated in the 325 HWTUs results from analyses of waste samples from sources already designated as F001 through F005. Manufacturing activities are not performed on the Hanford Facility; therefore, dangerous waste from specific sources (WAC 173-303-9904 K-listed waste) is not generated at PNNL. Small quantities of

K-listed waste, however, have been generated from treatability studies at PNNL in the past; the residues from these tests could be treated at the 325 HWTUs.

The F-listed waste is designated on the basis of the process knowledge (e.g., information from container labels, material safety data sheets [MSDS], or process information). Sampling might be performed if additional information is needed to document the composition and characteristics of the waste. The generator is responsible for specifying the characteristics of the waste, based on knowledge of the chemical products used (i.e., information supplied by the manufacturer) and the process that generated the waste. The F001- and F002-listed waste types are designated according to WAC 173-303-70 through WAC 173-303-100.

The K-listed waste in Attachment 36, Chapter 1.0, is designated based on the source of the process generating the original waste. These waste types are designated as dangerous waste, unless the waste is mixed with other constituents that require the mixture to be designated as extremely hazardous waste.

3.1.2 Laboratory Waste Resulting from Analysis of Samples

Laboratory waste resulting from analyzing samples makes up the largest volume of waste to be treated or stored in the 325 HWTUs. These waste types include those designated from the dangerous-waste source list as described in WAC 173-303-082, designated as characteristic dangerous waste under WAC 173-303-090, and designated as dangerous waste by the criteria set forth under WAC 173-303-100. These waste types are designated based on process knowledge (i.e., project requirements, client-supplied information, and process information) as well as analytical results. Currently, much of this waste is designated as listed waste from the dangerous-waste source list based on information provided by the generator. The waste is designated as dangerous waste unless constituent concentrations in the waste require the designation to be extremely hazardous waste.

3.1.3 Discarded Commercial Chemical Products

Discarded chemical products consist of those products listed in WAC 173-303-081. Attachment 36, Chapter 1.0, for the 325 HWTUs identifies all of the discarded chemical products listed in WAC 173-303-9903 (P001 through P123 and U001 through U359) and specifies an estimated maximum annual management quantity. Typically, only a few of these waste types are generated at any one time. Attachment 36, Chapter 1.0, lists all of the waste types, because the wide variety of research activities conducted on the Hanford Facility presents the potential for generating these waste types.

Waste types in this category are designated based on process knowledge. Because this waste is usually in the original container, information on the container label is verified by process knowledge (i.e., knowledge that material is in its original container) and the label is used to identify contents. Excess or expired chemicals that have been determined to be a waste and that are still in the original container will not be sampled. These listed-waste types contain those designated as dangerous waste as well as those designated as extremely hazardous waste. These waste types also are subject to land-disposal restriction (LDR) regulations under 40 CFR 268 and WAC 173-303-140, including disposal prohibitions and treatment standards.

3.1.4 Hazardous or Mixed Waste from Chemicals Synthesized or Created in Research Activities Using Radioactive Isotopes

Waste from research activities may contain radioactive isotopes in addition to RCRA regulated constituents. In such cases the wastes are designated as mixed waste. Typically such wastes are generated in small quantities, ranging from a few grams to a few liters. Waste is designated based on process knowledge or on the basis of sampling and analysis. Process knowledge is used if the generator has kept accurate records of the identities and concentrations of constituents present in the waste (e.g., log sheets for accumulation containers). If information available from the generator is inadequate for waste designation, the waste is sampled, and the results of the analysis are used for designation. These waste types include waste designated as characteristic dangerous-waste mixtures under WAC 173-303-090 and waste designated as dangerous waste under WAC 173-303-100. Attachment 36, Chapter 1.0, includes all categories of toxic, persistent, and carcinogenic waste mixtures (i.e., both dangerous waste and extremely hazardous waste). While not all of these waste types currently are generated or have been generated, the wide variety of research activities conducted on the Hanford Facility presents the potential that these waste types could be generated and could require subsequent management at the 325 HWTUs. Similarly, the Attachment 36, Chapter 1.0, includes the characteristic dangerous-waste categories D001 through D043 (i.e., ignitable, corrosive, reactive, and toxicity characteristics leaching procedure [TCLP] toxics caused by metals or organics content).

The waste also could be LDR waste regulated under 40 CFR 268 and WAC 173-303-140.

3.1.5 Discarded Commercial Chemical Products Exhibiting Dangerous-Waste Characteristics and/or Criteria

Many discarded chemical products handled in the 325 HWTUs are not listed in WAC 173-303-9903 but are still considered dangerous waste, because these products exhibit at least one dangerous-waste characteristic and/or criterion (WAC 173-303-090 and WAC 173-303-100). This waste is included in Attachment 36, Chapter 1.0, under waste numbers D001 through D043, WT01, WT02, WP01, WP02, WP03, and WSC2. This waste typically is received in the manufacturer's original container.

Waste in this category is designated based on the process knowledge. Because this waste is usually in the original container, information on the container label is used to identify the contents. This waste includes waste designated as dangerous waste and waste designated as extremely hazardous waste.

The waste also could be LDR waste regulated under 40 CFR 268 and WAC 173-303-140.

3.1.6 Waste Analysis Plan

The 325 HWTUs Waste-Analysis Plan describes the procedures used to obtain the information necessary to manage waste in accordance with the requirement of WAC 173-303. The following are described: sampling methods; analytical parameters and rationale; quality-control and quality-assurance procedures; requirements for incoming waste; storage requirements for ignitable, reactive, and incompatible waste; and the waste-tracking and record-keeping procedures.

3.1.7 Manifest System

Onsite waste shipments are manifested pursuant to Hanford Facility RCRA Permit (Permit) Condition 11.P.2. Offsite waste shipments are manifested in accordance with the requirements of WAC 173-303-370 and -180.

3.1.7.1 Procedures for Receiving Shipments

The onsite generator is responsible for identifying waste composition accurately and arranging for the transport of the waste. A copy of all other pertinent operating records are maintained by the 325 HWTUs for 5 years. The waste-tracking methods are as follows.

Inspection of Transfer Papers/Documentation – The necessary transfer papers for the entire transfer are verified (i.e., signatures are dated, all waste containers included in the transfer are accounted for and correctly indicated on the transfer documentation, there is consistency throughout the different transfer documentation, and the documentation matches the labels on the containers).

Inspection of Waste Containers – The condition of waste containers is checked to verify that the containers are in good condition (e.g., free of holes and punctures).

Inspection of Container Labeling – Transfer documentation is used to verify containers are labeled with the appropriate "Hazardous/Dangerous Waste" labeling and associated markings according to the contents of the waste container.

Acceptance of Waste Containers – The 325 HWTUs personnel sign the transfer documents and retain a copy.

If transport will be over public roads (unless those roads are closed to public access during waste transport), a Uniform Hazardous Waste Manifest will be prepared identifying the 325 HWTUs as the receiving unit. The 325 HWTUs operations staff will sign and date each copy of the manifest to certify that the dangerous waste covered by the manifest was received. The transporter will be given at least one copy of the signed manifest. A copy of the manifest will be returned to the generator within 30 days of receipt at the 325 HWTUs. A copy of the manifest also will be retained in the 325 HWTUs operating record for 5 years.

3.1.7.2 Response to Significant Discrepancies

The primary concern during acceptance of containers for storage is improper packaging or waste-tracking form discrepancies. Containers with such discrepancies are not accepted at the 325 HWTUs. Depending on the nature of the condition, such discrepancies can be resolved through the use of one or more of the following alternatives.

- Incorrect or incomplete entries on the Uniform Hazardous Waste Manifest or the onsite waste-tracking form can be corrected or completed with concurrence of the onsite generator or offsite generator. Corrections are made by drawing a single line through the incorrect entry. Corrected entries are initialed and dated by the individual making the correction.
- The waste packages can be held and the onsite generator or offsite waste generator can be requested to provide written instructions for use in correcting the condition before the waste is accepted.
- Waste packages can be returned as unacceptable.
- The onsite generator or offsite waste generator can be requested to correct the condition on the Hanford Facility before the waste is accepted.
- If a noncompliant dangerous-waste package is received from an offsite waste generator, and the waste package is nonreturnable because of condition, packaging, etc., and if an agreement cannot be reached among the involved parties as to resolving the noncompliant condition, then the issue will be referred to the U.S. Department of Energy-Richland Operations Office (DOE-RL) and the Washington State Department of Ecology (Ecology) for resolution. Ecology will be notified if a discrepancy is not resolved within 15 days after receiving a noncompliant shipment. Such waste packages, although not accepted, might be placed in the 325 HWTUs pending resolution. The package will be segregated from other waste and labeled in accordance with instructions in the unit contingency plan in the "Event Scenarios" section.

3.1.7.3 Provisions for Nonacceptance of Shipment

Provisions for nonacceptance of waste transfers are discussed in the following sections.

3.1.7.4 Nonacceptance of Undamaged Shipment

Before waste is brought into the 325 HWTUs, all associated documentation is inspected and verified for treatment and/or storage authorization. Any transfer of materials that the 325 HWTUs are not designed to treat and/or store neither are unloaded from the vehicle nor accepted for treatment or storage.

3.1.7.5 Activation of Contingency Plan for Damaged Shipment

If waste transfers arrive at the 325 HWTUs in a condition that presents a hazard to public health or the environment, the building emergency plan is implemented, as described in Attachment 36, Chapter 7.0.

3.1.8 Tracking System

Upon generation or receipt into the 325 HWTUs, each container of waste is assigned a unique tracking number. This number is used to track the following information:

- a description and the quantity of each dangerous waste received and the method(s) and date(s) of storage or treatment in the 325 HWTUs, in accordance with WAC 173-303-380(2)
- the location of each dangerous-waste container stored within the unit and the quantity at each location, including cross-reference to any applicable manifest and/or waste-tracking numbers
- waste-analysis results.

This system effectively tracks waste containers as the containers move through treatment or storage at the 325 HWTUs. The information is retained as part of the 325 HWTUs operating record, readily accessible for 5 years (refer to Attachment 36, Chapter 6.0, §6.2.2).

3.2 325 HAZARDOUS WASTE TREATMENT UNITS WASTE ANALYSIS PLAN

The 325 HWTUs are part of the Unit-Specific Portion of the Hanford Facility Dangerous Waste Permit Application, which reflects the organization of the Dangerous Waste Portion of the Hanford Facility Resource Conservation and Recovery Act Permit, WA7890008967.

The 325 HWTUs consist of two units; all within the 325 Building, located in the 300 Area on the Hanford Facility (refer to Attachment 36, Chapter 1.0). Attachment 36, Chapter 2.0 provides detailed location information.

The 325 Building includes the following: (1) a central portion (completed in 1953) that consists of three floors (basement, ground, and second) containing general-purpose laboratories, provided with special ventilation and work enclosures (2) a south (front) wing containing office space, locker rooms, and a lunch room; and (3) east and west wings containing shielded enclosures with remote manipulators. The Shielded Analytical Laboratory (SAL) is located in Rooms 32, 200, 201, 202, and 203. The HWTU is located in Rooms 520, 524 and 528. Figures 3.1 through Figure 3.2 provide drawings of the TSD units.

The fire water-collection tank, which serves rooms 520 and 528 of the HWTU, is located beneath Room 520 in the basement of the 325 Building. The rectangular tank measures 1.65 meters by 2.25 meters by 1.92 meters, and has a 22,710-liter capacity. The sides and floor of the tank are constructed of epoxy-coated carbon-steel plate. The steel sides and floor provide support for the chemical-resistant polypropylene liner. The tank is secured to the concrete floor of the 325 Building with 1.3-centimeter bolts at 1.82-meter intervals.

3.3 DESCRIPTION OF UNIT PROCESSES AND ACTIVITIES

The 325 HWTUs store and treat dangerous waste generated by Hanford Facility programs (primarily from research activities in the 325 Building and other Pacific Northwest National Laboratory [PNNL] facilities) and potentially from other onsite/offsite laboratories. Storage in containers and bench- or small-scale treatment of dangerous waste occur in both the HWTU and the SAL. As described in further detail in Attachment 36, Chapter 4.0, containers are managed in accordance with WAC 173-303-630; the SAL tank is managed and operated in accordance with WAC 173-303-640.

At the SAL, dangerous waste liquid is stored in a tank in Room 32.

Before receipt or acceptance of waste at the 325 HWTUs, the generator must supply adequate information to characterize and manage the waste properly. The information may include waste-characterization data, waste volume, container information, and process information.

If the material safety data sheets (MSDS), laboratory reagent, process knowledge, or analytical information provide insufficient information for a complete designation, the 325 HWTUs personnel require the generator unit to provide laboratory analyses before acceptance of the waste at the 325 HWTUs.

Containers in poor condition or inadequate for storage (e.g., damaged, not intact, or not securely sealed to prevent leakage) are not accepted in the 325 HWTUs. Examples of acceptable packaging include laboratory reagent bottles, U.S. Department of Transportation (DOT)-approved containers, spray cans, sealed ampules, paint cans, leaking containers that have been overpacked, etc. Unit operations personnel have the authority to determine whether a container is in poor condition or inadequate for storage using the criteria of WAC 173-303-190, and using professional judgment to determine whether the packaging could leak during handling, storage, and/or treatment. Containers will not be opened, handled, or stored in a manner that would cause the containers to leak or rupture. Containers will remain closed except when sampling, adding, or removing waste or when analysis or treatment of the waste is ongoing. Containers of incompatible waste are segregated in the storage areas.

The regulated waste managed in the 325 HWTUs includes dangerous waste designated as listed waste; waste from nonspecific sources; selected waste from specific sources, characteristic waste, and state-only. Dangerous wastes that are managed in the 325 HWTUs are listed by waste code in Attachment 36, Chapter 1.0.

Specific waste-treatment processes are found in the list of treatments in Attachment 36, Chapter 1.0. Attachment 36, Chapter 1.0, also provides the maximum process-design capacity for treatment and storage activities conducted in the HWTU and SAL.

All containers of dangerous waste are labeled to describe the contents of the container and the major hazards of the waste, as required under WAC 173-303-395. Each container is assigned a unique identifying number. All containers used for transfer are selected and labeled according to applicable regulations. Shipments may include manifesting and DOT compliance requirements. Shipments will be in accordance with 49 CFR as required by WAC 173-303-190.

The containers used for storage or treatment of dangerous waste is compatible with the waste stored in the containers.

All flammable-liquid waste is stored in compatible containers and in Underwriter's Laboratory (UL)-listed and Factory Mutual (FM)-approved flammable-storage cabinets or DOT-approved shipping containers. Solid chemicals are stored on shelving/flat surfaces in specifically designated areas based on need. All incompatible materials will be segregated. Storage of dangerous waste in the HWTU is governed by the Uniform Building Code restrictions (ICBO 1991).

325 HWTUs staff moves the dangerous waste containers in accordance with 325 HWTUs collection procedures that address safety and hazard considerations. The procedures cover various dangerous waste types and transportation modes. 325 HWTUs staff does not perform the operations, covered by a procedure, until they are formally trained on the procedure. All 325 HWTU staff is instructed in proper container handling and spill-prevention safeguards as part of their training. When in storage, containers are kept closed except when adding or removing waste, in accordance with WAC 173-303-630(5)(a).

Because of the nature of some dangerous waste stored at the SAL, it is often necessary to modify the standard containers. This modification ensures that the containers are specially shielded to reduce the hazard of the radioactive component of the dangerous waste stored in the container and are compliant with ALARA criteria. These specially designed shielded containers are packaged depending on the amount of shielding required. The shielding is accomplished by surrounding the containers with concrete, lead, or other materials to reduce the dose rate produced by the radiological component of the dangerous waste.

The requirements in WAC 173-303-140 encourage the best-management practices for dangerous waste according to the priorities of RCW 70.105.150. In order of priority, these are reduction; recycling; physical, chemical, and biological treatment; incineration; stabilization and solidification; and land filling. The 325 HWTUs will observe these priorities whenever a management option exists. Recycling will be performed whenever waste can be used as reagent material to treat other waste received. To the extent practical, reduction of waste will be incorporated in the treatment processes so that the volume of residues will be reduced.

3.3.1 Identification/Classification and Quantities of Dangerous Waste Generated or Managed at the 325 HWTUs and Restricted/Prohibited

The dangerous waste managed at the 325 HWTUs can be categorized as originating from the following general sources:

- listed waste from specific and nonspecific sources
- laboratory waste resulting from analysis of samples
- discarded commercial chemical products
- waste from hazardous or mixed chemicals synthesized or created in research activities using radioactive isotopes
- discarded commercial chemical products exhibiting dangerous-waste characteristics and/or criteria.

Each of these waste categories is discussed in the following sections, including waste descriptions, hazard characteristics, and basis for hazard designations. This information includes data that must be known to treat, store, or dispose of the waste as required under WAC 173-303-806(4)(a)(ii).

3.3.2 Listed Waste from Specific and Nonspecific

Waste from specific and nonspecific sources consists of listed waste identified in WAC 173-303-9904. Attachment 36, Chapter 1.0, for the 325 HWTUs identifies the following waste from this category:

- F001 – spent halogenated degreasing solvents and sludges
- F002 – spent halogenated solvents and still bottoms
- F003 – spent nonhalogenated solvents and still bottoms
- F004 – spent nonhalogenated solvents and still bottoms
- F005 – spent nonhalogenated solvents and still bottoms
- F006 – wastewater treatment sludges from electroplating operations
- F007 – spent cyanide-plating-bath solutions from electroplating operations
- F009 – spent stripping- and cleaning-bath solutions from electroplating operations where cyanides are used in the process
- F027 – discarded polychlorinated phenol formulations
- F039 – leachate resulting from the disposal of more than one restricted waste classified as hazardous
- K011 – bottom stream from the wastewater stripper in the production of acrylonitrile
- K013 – bottom stream from acrylonitrile column in the production of acrylonitrile

- K048 – dissolved air flotation (DAF) float from petroleum-refining industry
- K049 – slop oil emulsion solids from the petroleum-refining industry
- K050 – heat exchange, bundle-cleaning sludge from petroleum-refining industry
- K051 – American Petroleum Institute separator sludge from the petroleum-refining industry
- K052 – tank bottoms (leaded) from the petroleum-refining industry.

These halogenated and nonhalogenated solvents are in the form of spent solvents. Degreasing solvents (F001) as well as spent halogenated solvents (F002) are generated primarily in research and analytical processes. Spent nonhalogenated solvents (F003, F004, and F005) also come primarily from research laboratories. Much of the waste to be treated in the 325 HWTUs results from analyses of waste samples from sources already designated as F001 through F005. Manufacturing activities are not performed on the Hanford Facility; therefore, dangerous waste from specific sources (WAC 173-303-9904 K-listed waste) typically is not generated at PNNL. Small quantities of K-listed waste, however, have been generated from treatability studies and sample-characterization activities at PNNL in the past; the residues from these tests could be treated at the 325 HWTUs (if covered in Attachment 36, Chapter 1.0).

The F-listed waste is designated on the basis of the process knowledge (e.g., information from container labels, MSDS, or process information). Sampling might be performed if additional information is needed to document the composition and characteristics of the waste. The generating unit is responsible for specifying the characteristics of the waste, based on knowledge of the chemical products used (i.e., information supplied by the manufacturer) and the process generating the waste. The F001- and F002-listed waste types are designated according to WAC 173-303-70 through WAC 173-303-100.

The K-listed waste in Attachment 36, Chapter 1.0, is designated based on the source of the process generating the original waste. These waste types are designated as dangerous waste, unless the waste is mixed with other constituents that require the mixture to be designated as extremely hazardous waste.

3.3.3 Laboratory Waste Resulting from Analysis of Samples

Laboratory waste resulting from analyzing samples makes up the largest volume of waste to be treated or stored in the 325 HWTUs. These waste types include those designated from the dangerous-waste source list as described in WAC 173-303-082, designated as characteristic dangerous waste under WAC 173-303-090, and designated as dangerous waste by the criteria set forth under WAC 173-303-100. These waste types are designated based on process knowledge (e.g., project requirements, client-supplied information, and process information) as well as analytical results. Currently, much of this waste is designated as listed waste from the dangerous-waste source list, based on information provided by the generator. The waste is designated as dangerous waste unless constituent concentrations in the waste require the designation to be extremely hazardous waste.

3.3.4 Discarded Commercial Chemical Products

Discarded chemical products consist of those products listed in WAC 173-303-081. Attachment 36, Chapter 1.0, for the 325 HWTUs identifies all of the discarded chemical products listed in WAC 173-303-9903 (P001 through P123 and U001 through U359) and specifies an estimated maximum annual management quantity. Typically, only a few of these waste types are generated at any one time. Attachment 36, Chapter 1.0, lists all of the wastes, because the wide variety of research activities conducted on the Hanford Facility presents the potential for generating these waste types.

Waste types in this category are designated based on process knowledge. Because this waste is usually in the original container, information on the container label is verified by process knowledge (i.e., knowledge that material is in its original container) and the label is used to identify contents. Excess or expired chemicals that have been determined to be waste and that are still in the original container will not be sampled. These listed waste types contain those designated as dangerous waste as well as those designated as extremely hazardous waste. These waste types also are subject to LDR regulations under 40 CFR 268 and WAC 173-303-140, including disposal prohibitions and treatment standards.

3.3.5 Hazardous or Mixed Waste from Chemicals Synthesized or Created in Research Activities Using Radioactive Isotopes

Dangerous waste from research activities using radioactive isotopes is designated as dangerous waste and typically is generated in small quantities ranging from a few grams to a few liters. These waste types consist primarily of contaminated chemicals, such as organics. Waste is designated based on process knowledge or on the basis of sampling and analysis. Process knowledge is used if the generator has kept accurate records of the identities and concentrations of constituents present in the waste (e.g., log sheets for accumulation containers). If information available from the generator is inadequate for waste designation, then the waste is sampled and the results of the analysis are used for designation. These waste types include waste designated as characteristic dangerous-waste mixtures under WAC 173-303-090 and waste designated as dangerous waste under WAC 173-303-100. Attachment 36, Chapter 1.0, includes all categories of toxic and persistent waste mixtures (i.e., both dangerous waste and extremely hazardous waste). While not all of these waste types currently are generated or have been generated, the wide variety of research activities conducted on the Hanford Facility presents the potential that these waste types could be generated and could require subsequent management at the 325 HWTUs. Similarly, Attachment 36, Chapter 1.0, includes the characteristic dangerous-waste categories D001 through D043 (i.e., ignitable, corrosive, reactive, and TCLP toxic because of metals or organics content).

The waste also could be LDR waste, regulated under 40 CFR 268 and WAC 173-303-140.

3.3.6 Discarded Commercial Chemical Products Exhibiting Dangerous-Waste Characteristics and/or Criteria

Many discarded chemical products handled in the 325 HWTUs are not listed in WAC 173-303-9903 but are still considered dangerous waste because these products exhibit at least one dangerous-waste characteristic and/or criterion (WAC 173-303-090 and WAC 173-303-100). This waste is included in Attachment 36, Chapter 1.0, under waste numbers D001 through D043, WT01, WT02, WP01, WP02, WP03, and WSC2. This waste typically is received in the manufacturer's original container.

Waste in this category is designated based on the process knowledge. As this waste is usually in the original container, information on the container label is used to identify the contents. This waste includes waste designated as dangerous waste and waste designated as extremely hazardous waste. The waste also could be LDR waste regulated under 40 CFR 268 and WAC 173-303-140.

3.4 DESCRIPTION OF CONFIRMATION PROCESS

325 HWTUs staff requires confirmation on all dangerous wastes before acceptance into the unit for treatment or storage. Generators must supply adequate information to characterize and manage the waste properly. The information includes waste-characterization data, waste volume, container information, and process information. A flow chart describing the confirmation process is shown in Table 3.1.

3.4.1 Pre-Shipment Review

Essentially all of the waste received at the 325 HWTUs is characterized before acceptance because the waste streams are generated from known processes. Unknown wastes are analyzed by the generator before they are accepted into the 325 HWTUs. Nearly all dangerous waste generated in the 325 Building is generated from analytical or research processes, both of which require detailed records.

The primary source of information used by the generator to complete the waste-tracking form is process knowledge. Other information sources could be used, so long as these sources provide detailed information on the chemical constituents present, chemical concentrations, material characteristics (e.g., physical state, ignitability), and the characterization requirements on the waste-tracking form.

If the MSDS, laboratory reagent, process knowledge, or analytical information provides insufficient information for a complete designation, the 325 HWTUs personnel require the generator to provide laboratory analyses before acceptance of the waste at the 325 HWTUs.

All process knowledge and analytical data that are used for waste characterization, LDR determination, and/or treatment activities at this TSD unit shall be documented and placed in the Operating Record.

3.4.1.1 Technical Review Process Overview

This program, administered by the 325 HWTUs personnel, is designed to obtain the waste information required pursuant to 40 CFR 264.13 and WAC 173-303-300. The review is conducted by qualified 325 HWTUs personnel using procedural guidelines and professional judgment. The reviewer(s), at their discretion, could request additional information or require additional analytical data before determining waste acceptability.

The first step in evaluating the acceptability of a waste is to obtain a general description of the wastes and to identify the waste codes and regulatory requirements that apply to the waste.

Technical review of waste information is designed to accomplish three objectives: (1) determine if the 325 HWTUs can accept the material; (2) identify special handling procedures necessary to store the material safely before and during treatment; and (3) identify treatment technologies that meet waste-minimization efforts and applicable regulatory restrictions.

The waste-stream file includes the following information submitted by the generator and any literature reviews, records of conversations, etc., completed by the reviewer:

- copies of laboratory-test results, specific information on the process that generated the waste, MSDSs, etc., used to determine the components of the waste;
- waste characteristics, including compatibility, reactivity, ignitability, and corrosivity;
- documentation of conversations that clarify omissions or discrepancies;
- copies of data from additional analytical tests requested or conducted by the 325 HWTUs personnel; and
- container information, including number of containers, volume capacity of each of the containers, and type of material.

3.4.1.2 Review Criteria

The documentation and any required analyses must provide the information necessary to make decisions concerning waste acceptance or denial, storage requirements, treatments, legal/regulatory requirements, additional laboratory work, potential safety and handling hazards, and methods to verify that treatment is successful.

3.4.2 Verification

Where potential deficiencies exist in the information provided or where additional waste constituents might be expected to be present that do not appear in the supporting documentation, the generator is contacted by 325 HWTUs personnel for resolution. Upon approval, the 325 HWTUs personnel review the data package to determine whether or not the information is sufficient to complete the following:

- appropriate waste designation per WAC 173-303-070
- LDR per 40 CFR 268
- packaging, marking, and labeling requirements
- DOT compatibility groups, if applicable
- identification of a proper storage location within the 325 HWTUs.

Analysis and characterization, as required by WAC 173-303-300(2), are performed on each waste before acceptance at the 325 HWTUs to determine waste designation and characteristics. The characterization of the waste, based on this information, is reviewed each time a waste is accepted. The information must be updated by the generator annually or when the waste stream changes, whichever comes first, or if the following occurs.

- The 325 HWTUs personnel have reason to suspect a change in the waste, based on inconsistencies in packaging or labeling of the waste.
- The information submitted previously does not match the characteristics of the waste submitted.
- Parameters for the waste designation and/or characterization rationale are listed in Table 3.1.

Sampling and laboratory analysis or physical screening could be required to verify or establish waste characteristics for waste that is stored at the 325 HWTUs. The following are instances where sampling and laboratory analysis is required:

- inadequate information on PNNL-generated waste
- waste streams generated onsite will be verified at 5 percent of each waste stream
- waste streams received for treatment or storage from non-PNNL offsite generators will be verified at 10 percent of each waste stream applied per generator, per shipment
- identification and characterization for unknown waste and spills within the unit.

Exceptions to physical screening for verification are:

- Shielded, classified, and remote-handled mixed waste are not required to be physically screened; however, 325 HWTUs staff must perform a more rigorous documentation review and obtain the raw data to characterize the waste (<1 percent of current waste receipts).
- Waste which cannot be verified at the 325 HWTUs must be verified at the generating unit (e.g., large components, containers which cannot be opened, for ALARA reasons, or will not fit into the NDE unit). Physical screening at the customer location consists of observing packaging of the waste.

If no location can be found to do the physical screening, then no screening is required.

- Wastes which are packaged by the 325 HWTUs authorized independent agent are considered to have met the physical screening requirements (e.g., PNNL-packaged waste which is transferred to PNNL-operated TSD units).

A bulk-waste stream (e.g., large volumes of waste from a single generating event, such as soil remediation from a single event) may be verified by screening the allowable rate of the total number of loads throughout the waste stream.

3.5 SELECTING WASTE-ANALYSIS PARAMETERS

State and federal regulations [WAC 173-303-300(2) and (5)(a); WAC 173-303-140; 40 CFR 268.7(a)] require that information be obtained, documented, and/or reported on wastes received by a TSD unit. These requirements include ensuring that only waste which meet 325 HWTUs permit requirements are accepted, and reporting the information required by WAC 173-303-380. In addition to providing a general description of the waste, the focus of the information collected for regulatory purposes is to ensure that the 325 HWTUs are permitted to accept the waste and treat it to LDR requirements.

The 325 HWTUs accept only wastes that have been characterized properly. Before receipt or acceptance of waste at the 325 HWTUs, generators must supply adequate information to characterize and manage wastes properly.

One of the most important aspects of operating the 325 HWTUs in a safe manner is to ensure that incompatible wastes are not mixed together. For the purposes of this document, wastes are considered compatible when mixed they do not: (1) generate extreme heat or pressure, fire, or explosion, or violent reaction; (2) produce uncontrolled toxic mists, dusts, or gases in sufficient quantities to threaten human health; (3) produce uncontrolled flammable fumes or gases in sufficient quantities to pose a risk of fire or explosions; (4) damage the structural integrity of the device or facility containing the waste; or (5) through other like means threaten human health or the environment.

Sampling and laboratory analysis could be required to verify or establish waste characteristics for waste that is stored at the 325 HWTUs. The following are instances where sampling and laboratory analysis is required:

- inadequate information on PNNL-generated waste
- 5 percent waste verification for PNNL-generated waste
- 10 percent waste verification for non-PNNL-generated waste identification and characterization for unknown waste and spills within the unit.

3.5.1 Parameter Selection Process

The selection of analytical parameters is based on the State of Washington's *Dangerous Waste Regulations*, WAC 173-303-300 and *EPA Waste Analysis at Facilities That Generate, Treat, Store, and Dispose of Hazardous Wastes, A Guidance Manual* (EPA 1994).

3.5.2 Criteria and Rationale for Parameter Selection

Waste-testing parameters and the rationale for these parameters are summarized in Table 3.1. Testing parameters for each type of waste were selected to obtain data sufficient to designate the waste properly under WAC 173-303-070, meet requirements for Land Disposal Restrictions (LDR) (refer to Section 3.7.2), and to manage the waste properly. If information on the source of the waste is available, then all parameters might not be required, e.g., exclusion of testing for pesticides from a metal-machining operation.

Some of the analytical screening parameters that could be used for waste received at the 325 HWTUs are as follows.

- **Physical description** – used to determine the general characteristics of the waste. This facilitates subjective comparison of the sampled waste with previous waste descriptions or samples. Also, a physical description is used to verify the observational presence or absence of free liquids.

- **pH screen** – used to identify the pH and corrosive nature of an aqueous or solid waste, to aid in establishing compatibility strategies, and to indicate if the waste is acceptable for treatment and/or storage in the 325 HWTUs.

- **Cyanide screen** – used to indicate whether the waste produces hydrogen cyanide upon acidification below pH 2.

- **Sulfide screen** – used to indicate if the waste produces hydrogen sulfide upon acidification below pH 2.

- **Halogenated hydrocarbon content screen** – used to indicate whether chlorinated hydrocarbons or polychlorinated biphenyls (PCBs) are present in waste and to determine if the waste needs to be managed in accordance with the regulations prescribed in the *Toxic Substance Control Act of 1976*.

- **Ignitability screen** – used to identify waste that must be managed and protected from sources of ignition or open flame.

3.6 SELECTING SAMPLING PROCEDURES

Because of physical variations of the waste that could be received at 325 HWTUs, sampling methodologies differ among the waste streams. The specific sampling methods and equipment used will vary with the chemical and physical nature of the waste material and the sampling circumstances. In all instances, the sampling methods adhere to guidance provided in SW-846 and other pertinent references published and accepted by the EPA. In general, aqueous liquids will be sampled using polyethylene samplers, organic liquids will be sampled using glass samplers, and solids will be sampled using polyethylene samplers. Typical sample-container requirements for aqueous and solid samples are provided in Table 3.1.

Representative samples of liquid wastes (vertical "core sections") will be obtained using a composite liquid-waste sampler (COLIWASA) or tubing, as appropriate. If a liquid waste has more than one phase, then each phase will be separated for individual testing and designation. Other waste types that may require sampling are sludges, powders, and granules. In general, nonviscous sludges will be sampled using a COLIWASA. Highly viscous sludges and cohesive solids will be sampled using a trier, as specified in SW-846 (EPA 1986). Dry powders and granules will be sampled using a thief, also as specified in SW-846 (EPA 1986). The sampling methods and equipment used are identified on Table 3.2. In all instances, sampling methods will conform to the representative sample methods referenced in WAC 173-303-110(2), i.e., American Society for Testing and Materials (ASTM) standards for solids and SW-846 for liquids.

The number of samples collected will depend on the amount of waste present and on the homogeneity of the waste, as determined by observation. In most instances, there will be only one container of waste present. In such instances, only one vertical composite sample will be collected (e.g., COLIWASA). If more than one container of a waste stream is present, then a random number of samples will be collected and analyzed statistically using the procedures specified in Section 9.2 of SW-846 (EPA 1986).

Generators or 325 HWTUs personnel are responsible for arranging all sampling and laboratory support for sample analysis. Samples are processed either onsite or offsite at one of several laboratories qualified to perform analysis of waste samples in accordance with SW-846 methods. Sampling methodologies are included in Table 3.2.

Table 3.1. Sample-Container Compatibility

Sample	Container		
	Plastic	Glass	Metal
Acids (except hydrofluoric acid)	*	*	
Hydrofluoric acid	*		
Alkali	*	*	
Solvents/solvent-contaminated oils	*[1]	*	*
Oils	*	*	*
Solids	*	*	*
Aqueous waste	*	*	*

* Sample compatible for storage in this type of container.
[1] Polypropylene may be used with some solvent/solvent-oil waste.

Table 3.2. Sampling Methods and Equipment

Material	Sampling Method	Sampling Equipment
Containerized liquids	SW-846	COLIWASA* or tubing
Extremely viscous liquid	ASTM D140-70	Tubing or trier
Crushed or powdered material	ASTM D364-75	Tubing, trier, auger, scoop or shovel
Soil or rock-like material	ASTM D420-69	Tubing, trier, auger, scoop or shovel
Soil-like material	ASTM D1452-65	Tubing, trier, auger, scoop or shovel
Fly ash-like material	ASTM D2234-76	Tubing, trier, auger, scoop or shovel
Containment systems	Wipe sample (OSHA 1977)	Filter paper and cleaning solution

* COLIWASA: composite liquid-waste sampler.

Generators or 325 HWTUs personnel also document the sampling activities and chain of custody and arrange sample shipment. Sampling information, custody records, and analytical results are submitted as part of the waste-tracking form data package submitted by the generator to the waste-management section for review, approval, and designation.

All sampling will conform to the protocols in SW-846 or an equivalent. These protocols are described briefly in the following paragraphs.

Sample-control procedures (i.e., chain-of-custody forms) are designed to ensure that each sample is accounted for at all times. The primary objectives of the sample-control procedures are as follows:

- Each sample received for analysis is uniquely identified.
- Correct samples are analyzed and are traceable to the applicable data records.
- Important and necessary sample constituents are preserved.
- Samples are protected from loss, damage, or tampering.
- Any alteration of samples during collection or shipping (e.g., filtration, preservation, breakage) is documented.
- A record of sample custody and integrity is established that will satisfy legal scrutiny.

Sample-container selection is crucial to sample quality. Considering waste compatibility, durability, volume, and analytical sensitivities, the containers listed in Table 3.1 are recommended to the generators for these efforts.

The basic sampling procedure is as follows:

- Obtain samples using a precleaned sampler.
- Fill sample containers in the following sequence: head-space volatile organics, volatile organics, semi-volatile organics, metals, ignitability, pH (corrosivity), and reactivity.
- Label sample containers.
- Properly clean and decontaminate sample containers and the sampling hardware.
- Custody-seal and blister-wrap all sample containers, place wrapped containers in a leak-tight polyethylene bag, and place samples in a durable ice-filled cooler or comparable receptacle for transport to the laboratory or laboratory receiving facility. If ALARA practices allow, custody-seal and blister-wrap will be used; otherwise, seals will be placed on secondary containers.
- Complete the chain-of-custody and request-for-analysis forms.
- Review all paperwork and enclose the forms in a leak-tight polyethylene bag taped to the underside of the cooler lid or attach paperwork to the container as appropriate.
- Seal and mark the coolers or comparable receptacles in accordance with applicable DOT requirements.

Transport coolers or appropriate containers to the analytical laboratory or laboratory receiving facility.

All samples are labeled with at least the following information:

- a unique alpha-numeric identifier
- date and time of collection
- sample collector's name
- preservatives used
- analyses requested.

Immediately after collection, samples are placed on blue ice or an equivalent, as required, in durable coolers or comparable receptacles for transport to the offsite laboratory. Before shipping or transfer, coolers or comparable receptacles are tightly sealed with tape and are custody-sealed along the front and back edges of the lids. Samples are transported to offsite laboratories by overnight courier to ensure delivery within 24 hours of sample collection as allowed or dependent upon sample holding times. All offsite sample collection, preparation, packaging, transportation, and analyses conform to the requirements of SW-846 or equivalent.

During all sampling activities, strict compliance with health physics, industrial hygiene, and safety standards is mandatory. Personnel are required to wear eye-, skin-, and respiratory-protection gear as dictated by industrial hygiene and health- physics personnel. If personnel accidentally contact waste material, decontamination procedures are to be performed immediately.

A chain-of-custody record accompanies samples being analyzed for chemical constituents at all times. The record contains the sample number, date and time of collection, sample description, and signatures of the collector and all subsequent custodians.

Transportation of samples is in accordance with the DOT and the DOE-RL requirements. Hazardous-waste samples are properly packaged, marked, and labeled. For offsite shipments, shipping papers are prepared in accordance with applicable DOT regulations.

All equipment used to sample waste materials is disposable or designed for easy decontamination. Cleanable equipment is thoroughly decontaminated before reuse. Decontamination solutions are managed as hazardous waste as appropriate, according to the threshold-contaminant levels exceeded in the sampled liquids. Disposable samplers will be used whenever possible to eliminate the potential for cross-contamination.

3.6.1 Sample Custody

The generators or 325 HWTUs personnel are responsible for initiating and following chain-of-custody form. Generators initiate sample-custody records in the field at the time samples are collected. A chain-of-custody form is used to document sample-collection activities, including sampling site, sample identification, number of samples, and date and time of collection. Additionally, the form documents the chain of custody including the names of responsible individuals and the dates and times of custody transfers.

3.6.2 Sample Receipt and Storage

Samples are received at a qualified contracted laboratory or laboratory receiving facility by a sample custodian. This individual carefully reviews received samples and documentation for compliance with sampling and documentation requirements, such as type and condition of container, sample preservation, collection date, and chain-of-custody forms. The sample custodian signs and dates the chain-of-custody form after verifying that all samples submitted are listed and that the required information is listed on the form. The sample custodian places an identification number on each sample and returns the samples to a refrigerator, if required, designated for storage of samples requiring analysis, as required. The sample custodian stores and secures the samples appropriately (e.g., in a locked refrigerator). Based on the type of sample and analysis requested, special procedures for sample handling, storage, and distribution could be specified.

3.7 SAMPLE DISTRIBUTION

Where practical, chain-of-custody documentation for samples continues throughout the analytical process. After logging in and storing the samples, the sample custodian distributes sample documentation, which lists sample numbers and analyses to be performed, to the appropriate analysts and technical leaders. On completion of analyses, results are submitted to the generators or 325 HWTUs personnel along with QA/QC information.

3.7.1 Field Analytical Methods

Analytical methods employed to verify or characterize waste are of two types: fingerprint analysis and laboratory analysis. Fingerprint analysis is used primarily to verify waste characteristics of waste received from offsite. Laboratory analytical methods will be employed to establish waste identity and characteristics and verify waste characteristics when 325 HWTUs personnel determine it is necessary.

3.7.1.1 Fingerprint Sampling Analytical Methods

A representative sample will be taken of the waste (if more than one phase is present, each phase must be tested individually), and the following field tests will be performed:

- **Reactivity** – HAZCAT™ oxidizer, cyanide, and sulfide tests. These tests will **not** be performed on materials known to be organic peroxides, ethers, and/or water-reactive compounds.

- **Flashpoint/explosivity** – by HAZCAT™ flammability Procedure B, explosive-atmosphere meter, or a closed-cup flashpoint-measurement instrument.

- **pH** - by pH meter or pH paper (SW-846 9041). This test will not be performed on non-aqueous materials (i.e., organic solvents).
- **Halogenated organic compounds** - by organic-vapor analyzer with a flame ionization detector, Chlor-D-Tect kits, or the HAZCAT™ fluoride, chloride, bromide, and iodide tests.
- **Volatile organic compounds** – by gas chromatograph/mass spectrometer or gas chromatograph (GC) with a photo- or flame-ionization detector.

If the waste meets the parameters specified in the documentation, then confirmation of designation is complete. If the waste does not meet these parameters, then proceed to the next step.

1. Sample and analyze the materials in accordance with WAC 173-303-110.
2. Reassess and re-designate the waste. Repackage and label as necessary or return to the generator.
3. Data obtained through the waste-verification process will be used to verify the accuracy of the waste designation for waste received at 325 HWTUs.

3.7.2 LDR Waste-Analysis Requirements

The *Hazardous and Solid Waste Amendments of 1984* prohibit the land disposal of certain types of waste that are subject to RCRA. Many of the waste types stored at 325 HWTUs fall within the purview of these LDRs. Information presented below describes how generators and 325 HWTUs personnel characterize, document, and certify waste subject to LDR requirements.

3.7.2.1 Waste Characterization

Shipments of waste shall not be accepted from any off-site generator without LDR certification, if applicable, accompanying each shipment. For waste received from off-site generators, the TSD unit shall receive the information pursuant to 40 CFR 268 regarding LDR wastes. The generator must sign the LDR certification.

Before being received at 325 HWTUs, the RCRA waste characteristics, the level of toxicity characteristics, and the presence of listed, wastes are determined during the physical and chemical analyses process. This information allows waste-management personnel to make all LDR determinations accurately and complete appropriate notifications and certifications.

3.7.2.2 Sampling and Analytical Procedures

The LDR characterization and analysis may be performed as part of the waste-characterization and analysis process. If waste is sampled and analyzed for LDR characterization, then only EPA or equivalent methods are used to provide sufficient information for proper management and for decisions regarding LDRs pursuant to 40 CFR 268.

3.7.2.3 Frequency of Analysis

Before acceptance and during the waste-characterization and analysis process, all LDR characterizations and designations are made. The characterization and analysis process is performed when a disposal request is submitted for waste pick-up, unless there is insufficient data or if the waste stream has changed. Instances where sampling and laboratory analysis may be required to determine accurate LDR determinations include the following:

- when waste-management personnel have reason to suspect a change in the waste based on inconsistencies in the waste-tracking form, packaging, or labeling of the waste

- when the information submitted previously by a generator does not match the characteristics of the waste that was submitted
- when the offsite TSD facility rejects the waste because the fingerprint samples are inconsistent with the waste profile provided by 325 HWTUs, which was established using generator information.

3.7.2.4 Documentation and Certification

The 325 HWTUs have and will continue to receive and store LDR waste. Because 325 HWTUs personnel determine designations and characterization, including LDR determinations, all notifications and certifications, as required by 40 CFR 268, are prepared by PNNL qualified staff for PNNL-generated waste. The 325 HWTUs staff collect from the generator(s) the information pursuant to 40 CFR 268 regarding LDR wastes, the appropriate treatment standards, whether the waste meets the treatment standards, and certification that the waste meets the treatment standards, if necessary, as well as any other data, e.g., documented process knowledge and waste-analyses data that support the generator's determinations. If any of the requested information is not supplied by the generator, then the 325 HWTUs personnel complete and transmit all subsequent information regarding LDR wastes, pursuant to 40 CFR 268. The notification and certifications are submitted to onsite and offsite TSD units during the waste-shipment process. Additionally, any necessary LDR variances are prepared and submitted by PNNL qualified staff.

The 325 HWTUs staff requires applicable LDR information/notifications from non-PNNL generators.

Where an LDR waste does not meet the applicable treatment standards set forth in 40 CFR 268, Subpart D, or exceeds the application prohibition levels set forth in 40 CFR 268.32 or Section 3004(d) of RCRA, 325 HWTUs provides to the onsite and offsite TSD a written notice that includes the following information:

- EPA hazardous-waste number
- the corresponding treatment standards and all applicable prohibitions set forth in WAC 173-303, 40 CFR 268.32, or RCRA Section 3004(d)
- the manifest number associated with the waste
- all available waste-characterization data.
- identification of underlying hazardous constituents.

In instances where 325 HWTUs determines that a restricted waste is being managed that can be land-disposed without further treatment, 325 HWTUs staff submits a written notice and certification to the onsite or offsite TSD where the waste is being shipped, stating that the waste meets applicable treatment standards set forth in WAC 173-303-140 (40 CFR 268, Subpart D), and the applicable prohibition levels set forth in 40 CFR 268.32 or RCRA Section 3004(d). The notice includes the following information:

- EPA hazardous-waste number
- corresponding treatment standards and applicable prohibitions
- waste-tracking number associated with the waste
- all available waste-characterization data
- identification of underlying hazardous constituents.

The certification accompanying any of the previously described notices is signed by an authorized representative of the generator and states the following:

I certify under penalty of law that I personally have examined and am familiar with the waste through analysis and testing or through knowledge of the waste to support this certification that the waste complies with the treatment standards specified in 40 CFR Part 268 Subpart D and all applicable prohibitions set forth in 40 CFR 268.32 or RCRA Section 3004(d). I believe that the information I *submitted is true, accurate, and complete. I am aware that there are significant penalties for submitting a false certification, including the possibility of a fine and imprisonment.*

Copies of all notices and certifications described are retained at the TSD unit for at least 5 years from the date that the waste was last sent to an onsite or offsite TSD unit. After that time, the notices and certifications are sent to Records Storage.

3.7.3 Waste Analysis for Spills and Unknowns

In the event of a spill or release of dangerous waste within 325 HWTUs, the following steps will be implemented:

1. The identification number on the leaking container will be determined based on visual inspection. If the container(s) involved cannot be approached, the location of the container involved and the associated storage-cell designations can be determined from a distance.
2. The container-identification number or container-location number will be entered into 325 HWTUs inventory database to determine the Disposal Request number.
3. The hard copy of the Disposal Request or a computerized information printout for the container, which contains all applicable information regarding the contents of the container, will be located. The hazards associated with the waste will be determined before exercising the emergency-response procedures outlined in Attachment 36, Chapter 7.0.
4. Respond to the spill in accordance with the requirements of Attachment 36, Chapter 7.0. The Attachment 36, Chapter 7.0, Contingency Plan is implemented if there is a threat to human health or the environment.
5. A new Disposal Request will be filled out using the information from the original Disposal Request and information from any spill-cleanup kits or absorbents. The waste will then be designated and characterized.

If a leak or other liquid is discovered in the 325 HWTUs that cannot be tracked to a specific container because of safety or logistics reasons, then the procedures outlined in Attachment 36, Chapter 7.0, *325 HWTUs Contingency Plan* would be implemented for responding to an "unknown" chemical release. The residues, including cleanup absorbents, of such a release would be sampled and analyzed in accordance with the requirements in the Attachment 36, Chapter 7.0, determine the characteristics of the waste residue as defined by WAC 173-303-070. Sampling and analysis of the residues will include pH, metals, volatile organics, and semi-volatile organics analyses, as required.

Based on the information gathered from the laboratory analysis, a new Disposal Request for the waste cleanup will be filled out. The waste will then be designated and characterized.

3.8 SELECTING A LABORATORY, LABORATORY TESTING, AND ANALYTICAL METHODS

Laboratory selection is limited; only a few laboratories are equipped to handle mixed waste because of special equipment and procedures that must be used to minimize personnel exposure. Preference will be given to the 325 Analytical Chemistry Laboratory (ACL) and then to other laboratories on the Hanford Facility that exhibit demonstrated experience and capabilities in three major areas:

1. comprehensive written QA/QC program based on DOE-RL requirements specifically for that laboratory

2. audited for effective implementation of QA/QC program
3. participate in performance-evaluation samples to demonstrate analytical proficiency.

All laboratories (onsite or offsite) are required to have the following QA/QC documentation.

- Daily analytical data generated in the contracted analytical laboratories is controlled by the implementation of an analytical laboratory QA plan.
- Before commencement of the contract for analytical work, the laboratory will, if requested, have their QA plan available for review. At a minimum, the QA plan will document the following:
- sample custody and management practices
- requirements for sample preparation and analytical procedures
- instrument maintenance and calibration requirements
- internal QA/QC measures, including the use of method blanks
- required sample preservation protocols
- analysis capabilities.

3.8.1 Testing and Analytical Methods

325 HWTUs customers will need to conduct analyses to provide information to fill out Disposal Requests, and to determine compatibility, safety, and operating information. As needed, 325 HWTUs staff also will conduct analyses to determine completeness of information and if treatment and verification material meets the acceptance criteria for treatment or storage at one of the Hanford Facility-permitted treatment/storage/disposal areas or that of the offsite TSD facility. Testing and analytical methods will depend on the type of analysis sought and the reason for needing the information.

All testing is performed by chemists and/or appropriate analytical personnel working under approved QA guidelines. Analytical methods will be selected from those that are used routinely by the Analytical Chemistry Laboratory (ACL) in located in the 325 Building or the various Hanford Facility analytical laboratories.

The 325 HWTUs manages limited quantities of dangerous waste; therefore, deviations from SW-846 protocols may occur during its analysis. Many of the deviations from the SW-846 protocols arise from the mixed waste nature of the samples handled.

Analytical methods will be selected from those that are routinely used by the ACL in 325 HWTUs, or by the various Hanford Facility analytical laboratories.

3.8.2 Quality Assurance and Quality Control

PNNL is committed to maintaining a high standard of quality for all of its activities. A crucial element in maintaining that standard is a quality-assurance program that provides management controls for conducting activities in a planned and controlled manner and enabling the verification of those activities.

Activities pertaining to waste analysis include, but are not limited to, the preparation, review, and control of procedures and the selection of analytical laboratories. The PNNL QA manual has administrative procedures that establish requirements and provide guidance for the preparation of analytical and technical (i.e., sampling, chain-of-custody, work processes) procedures, as well as other administrative procedures. Procedures undergo a review cycle and, once issued, are controlled to ensure that only current copies are used.

The primary purpose of waste testing is to ensure that the waste is properly characterized in lieu of process-knowledge data, in compliance with RCRA requirements for general waste analysis [WAC 173-303-300(2); 40 CFR 264.13]. Waste testing also is performed to ensure the safe management of waste being stored, proper disposition of residuals from incidents that might occur, and control of the acceptance of waste for storage. The specific objectives of the waste-sampling and analysis program at 325 HWTUs are as follows:

- Identify the presence of waste that is substantially different from waste currently stored.
- Provide a detailed chemical and physical analysis of a representative sample of the waste, before the waste is accepted at or transferred from 325 HWTUs to an offsite TSD facility, to ensure proper management and disposal.
- Provide an analysis that is accurate and current to ensure that waste is properly treated and disposed of.
- Ensure safe management of waste undergoing storage at 325 HWTUs.
- Ensure proper disposal of residuals.
- Ensure compliance with LDRs.
- Identify and reject waste that does not meet 325 HWTUs acceptance requirements (e.g., incomplete information).
- Identify and reject waste that does not meet specifications for 325 HWTUs (i.e., Attachment 36, Chapter 1.0, listing is restricted from storage at 325 HWTUs).

3.8.3 Quality Assurance and Quality Control Objectives

The objectives of the QA/QC program are two-fold. The first objective is to control and characterize any errors associated with the collected data. Quality-assurance activities, such as the use of standard procedures for locating and collecting samples, are intended to limit the introduction of error. Quality-control activities, such as the collection of duplicate samples and the inclusion of blanks in sample sets, are intended to provide the information required to characterize any errors in the data. Other QC activities, such as planning the QC program and auditing ongoing and completed activities, ensure that the specified procedures are followed and that the QA information needed for characterizing error is obtained.

The QA/QC control program for sampling and analysis related to this TSD unit must, at a minimum, comply with the applicable Hanford Site standard requirements and regulatory requirements. All analytical data shall be defensible and shall be traceable to specific, related quality control samples and calibrations.

The second QA/QC objective is to illustrate that waste testing has been performed according to specification in this waste-analysis plan. The QA/QC activities will include the following:

- **Field inspections** – performed by a PNNL QA officer or designee, depending on the activity. The inspections primarily are visual examinations but might include measurements of materials and equipment used, techniques employed, and the final products. The purpose of these inspections is to verify that a specific guideline, specification, or procedure for the activity is completed successfully.

- **Field testing** – performed onsite by the QA officer (or designee) according to specified procedures.
- **Laboratory analyses** – performed by onsite or offsite laboratories on samples of waste. The purpose of the laboratory analyses is to determine constituents or characteristics present and the concentration or level.
- **Checklists** – required for crucial inspections. Checklists are filled out during the course of inspection to document inspection results.
- **Instrument calibration** – required for maintaining records of calibration of all instruments used to perform surveying, field testing, and laboratory analyses.

3.8.4 Sampling Objectives

The data-quality objectives (DQO) for the waste sampling and data analyses are as follows:

- Determine if waste samples are representative of the contents of the containers at the time the samples were taken.
- Determine if waste samples are representative of long-term operations affecting 325 HWTUs.
- Determine if waste accepted for storage is within the RCRA permit documentation limitations.
- Determine if waste accepted for storage meets the requirements of 325 HWTUs waste-acceptance criteria.
- Determine if waste accepted for storage meets the information provided by the generator.

3.8.5 Data Collection/Sampling Objectives

For determining the toxicity characteristics, SW-846 Method 1311 should be followed wherever possible. The Permittee may use the total metals test and assumption of complete extractability as described in Method 1311. A reduced sample size may also be utilized for As Low As Reasonably Achievable purposes as recommended by the *Joint NRC/EPA Guidance on Testing Requirements of Mixed Radioactive and Hazardous Waste* (62 FR 62079).

For a given parameter, analytical methods are selected and may be modified as long as the applicable precision, accuracy, and quantitation limit (or minimum detectable activity) necessary to meet the regulatory or decision limit can be met or improved.

For a given parameter, analytical methods are selected and may be modified as long as the applicable precision, accuracy, and quantitation limit (or minimum detectable activity) necessary to meet the regulatory or decision limit can be met or improved.

The acquired data need to be scientifically sound, of known quality, and thoroughly documented. The DQOs for the data assessment will be used to determine compliance with national quality standards, which are as follows:

- **Precision** – The precision will be the agreement between the collected samples (duplicates) for the same parameters, at the same location, and from the same collection vessel.

- **Representativeness** – The representativeness will address the degree to which the data accurately and precisely represent a real characterization of the population, parameter variation at a sampling point, sampling conditions, and the environmental condition at the time of sampling. The issue of representativeness will be addressed for the following points:

- Based on the generating process, the waste stream, and its volume, an adequate number of sampling locations are selected

The representativeness of selected media has been defined accurately.

- The sampling and analytical methodologies are appropriate.

- The environmental conditions at the time of sampling are documented.

- **Completeness** – The completeness will be defined as the capability of the sampling and analytical methodologies to measure the contaminants present in the waste accurately.

- **Comparability** – The comparability of the data generated will be defined as the data that are gathered using standardized sampling methods, standardized analyses methods, and quality-controlled data-reduction and validation methods.

3.8.6 Analytical Objectives

Analytical data will be communicated clearly and documented to verify that laboratory data-quality objects are achieved.

3.8.7 Field Quality Assurance and Quality Control

Internal QA/QC checks will be established by submitting QA and QC samples to the analytical laboratory. The number of field QA samples will be approximately 5 percent of the total number of field samples taken. The five percent criterion commonly is accepted for a minimum number of QA/QC samples. The types and frequency of collection for field QA samples are as follows:

- Field Blanks – A sample of analyte-free media taken from the laboratory to the sampling site and returned to the laboratory unopened. Field blanks are prepared and preserved using sample containers from the same lot as the other samples collected that day. A sample blank is used to document contamination attributable to shipping and field-handling procedures. This type of blank is useful in documenting contamination of volatile organics samples.

- Field Duplicates – defined as independent samples collected in such a manner that the samples are equally representative of the variables of interest at a given point in space and time. The laboratory will use the field duplicate as laboratory duplicate and/or matrix spikes. Thus, for the duplicate sample, there will be the normal sample analysis, the field duplicate, and the laboratory duplicate (inorganic analysis). Duplicate samples will provide an estimate of sampling precision.

3.8.8 Laboratory Quality Assurance and Quality Control

All analytical work, whether performed in-house by PNNL's ACL or by outside, independent laboratories, is defined and controlled by a Statement of Work, prepared in accordance with administrative procedures. The daily quality of analytical data generated in the analytical laboratories will be controlled by the implementation of an analytical laboratory QA plan. At a minimum, the plan will document the following:

- sample custody and management practices
- requirements for sample preparation and analytical procedures
- instrument maintenance and calibration requirements
- internal QA/QC measures, including the use of method blanks

- required sample preservation protocols
- analysis capabilities.

The types of internal quality-control checks are as follows:

- **Method Blanks** – Method blanks usually consist of laboratory reagent-grade water treated in the same manner as the sample (i.e., digested, extracted, distilled) that is analyzed and reported as a standard sample would be reported.

- **Method Blank Spike** – A method blank spike is a sample of laboratory reagent-grade water fortified (spiked) with the analytes of interest, which is prepared and analyzed with the associated sample batch.

- **Laboratory Control Sample** – A QC sample introduced into a process to monitor the performance of the system.

- **Matrix Spikes** – An aliquot of sample spiked with a known concentration of target analyte(s). The spiking occurs prior to sample preparation and analysis. Matrix spikes will be performed on 5 percent of the samples (1 in 20) or one per batch of samples.

- **Laboratory Duplicate Samples** – Duplicate samples are obtained by splitting a field sample into two separate aliquots and performing two separate analyses on the aliquots. The analyses of laboratory duplicates monitor the precision of the analytical method for the sample matrix; however, the analyses might be affected by nonhomogeneity of the sample, in particular, by nonaqueous samples. Duplicates are performed only in association with selected protocols. Duplicates are performed only in association with selected protocols. Laboratory duplicates are performed on 5 percent of the samples (1 in 20) or one per batch of samples. If the precision value exceeds the control limit, then the sample set must be reanalyzed for the parameter in question.

- **Known QC Check Sample** – This is a reference QC sample as denoted by SW-846 of known concentration, obtained from the EPA, the National Institute of Standards and Technology, or an EPA-approved commercial source. This QC sample is taken to check the accuracy of an analytical procedure. The QC sample is particularly applicable when a minor revision or adjustment has been made to an analytical procedure or instrument. The results of a QC-check-standard analysis are compared with the true values, and the percent recovery of the check standard is calculated.

3.8.8.1 PNNL Analytical Chemistry Laboratory QA/QC

PNNL's analytical chemistry laboratory may need to be used to analyze samples of high-activity dangerous waste. It has a rigorous QA plan that ensures that data produced are defensible, scientifically valid, and of known precision and accuracy, and meets the requirements of its clients, i.e., the 325 HWTUs.

3.8.8.2 Offsite Laboratory QA/QC

When it is necessary to send samples to an independent laboratory, contracts are not awarded until a pre-award evaluation of the prospective laboratory has been performed. The pre-award evaluation process involves the submittal of its QA plan to the waste-analysis project manager and the QA officer for approval. It also may involve a site visit by QA personnel and a technical expert, or may consist of a review of the prospective laboratories' QA/QC documents and records of surveillances/inspections, audits, nonconformances, and corrective actions maintained by PNNL or other Hanford Facility contractors.

3.8.9 Record-Keeping

Records associated with the waste-analysis plan and waste-verification program are maintained by the waste-management organization. A copy of the Disposal Request for each waste stream accepted at 325 HWTUs is maintained as part of the operating record. Generators maintain their sampling and analysis records. The waste-analysis plan will be revised whenever regulation changes affect the waste-analysis plan.

3.9 SELECTING WASTE RE-EVALUATION FREQUENCIES

Some analysis will be needed to verify that waste streams received by the 325 HWTUs conform to the information on the Disposal Request and or the waste analysis sheet supplied by the generator. If discrepancies are found between information on the Disposal Request, hazardous-waste manifest, shipping papers, waste- analysis documentation and verification analysis, then the discrepancy will be resolved by:

1. returning waste to the generator, or sample and analyze the materials in accordance with WAC 173-303-110; and/or
2. reassessing and re-designating the waste; repackaging and labeling as necessary or return to the generator.

Periodic re-evaluation provides verification that the results from the initial verification are still valid. Periodic re-evaluation also checks for changes in the waste stream.

Exceptions to physical screening for verification are:

- Shielded, classified, and remote-handled mixed waste are not required to be physically screened; however, 325 HWTUs staff must perform a more rigorous documentation review and obtain the raw data to characterize the waste (< 1 percent of current waste receipts).
- Wastes which cannot be verified at the 325 HWTUs must be verified by the generator (e.g., large components, containers which cannot be opened, for ALARA reasons, or will not fit into the NDE unit).

Analysis and characterization, as required by WAC 173-303-300(2), are performed on each waste before acceptance at the 325 HWTUs to determine waste designation and characteristics. The characterization of the waste, based on this information, is reviewed each time a waste is accepted. The information must be updated by the generator annually or when the waste stream changes, whichever comes first, or if the following occurs.

- The 325 HWTUs personnel have reason to suspect a change in the waste, based on inconsistencies in packaging or labeling of the waste.
- The information submitted previously does not match the characteristics of the waste submitted.

Sampling and laboratory analysis could be required to verify or establish waste characteristics for waste that is stored at the 325 HWTUs. The following are instances where sampling and laboratory analysis are required:

- inadequate information on PNNL-generated waste
- waste streams generated onsite will be verified at 5 percent of each waste stream
- inadequate information before waste was shipped or discrepancy discovered
- waste streams received for treatment from offsite generators will be verified at 10 percent of each waste stream applied per generator, per shipment
- identification and characterization for unknown waste and spills.

3.10 SPECIAL PROCEDURAL REQUIREMENTS

3.10.1 Procedures for Receiving Shipments

The generator is responsible for identifying waste composition accurately and arranging for the transport of the waste. A copy of each transfer-tracking form and any other pertinent operating records are maintained by the 325 HWTUs for 5 years. The waste-tracking methods are as follows.

- **Inspection of Transfer Papers/Documentation** – The necessary transfer papers for the entire transfer are verified (i.e., signatures are dated, all waste containers included in the transfer are accounted for and correctly indicated on the transfer documentation, there is consistency throughout the different transfer documentation, and the documentation matches the labels on the containers).
- **Inspection of Waste Containers** – The condition of waste containers is checked to verify that the containers are in good condition (i.e., free of holes and punctures).
- **Inspection of Container Labeling** – Transfer documentation is used to verify that the containers are labeled with the appropriate "Hazardous/Dangerous Waste" labeling and associated markings according to the contents of the waste container.
- **Acceptance of Waste Containers** – The 325 HWTUs personnel sign the transfer documents and retain a copy.

If transport will be over public roads (unless those roads are closed to public access during waste transport) or offsite, then a Uniform Hazardous Waste Manifest will be prepared identifying the 325 HWTUs as the receiving unit (Permit Condition II.Q.1). The 325 HWTUs operations staff will sign and date each copy of the manifest to certify that the dangerous waste covered by the manifest was received. The transporter will be given at least one copy of the signed manifest. A copy of the manifest will be returned to the generator within 30 days of receipt at the 325 HWTUs. A copy of the manifest also will be retained in the 325 HWTUs operating records for 3 years.

For all shipments of dangerous waste to or from the 325 HWTUs, the Permittees shall comply with the applicable information in Permit Conditions II.Q.1.h. and II.Q.2. For clarification, all dangerous waste must be transported in accordance with the unit specific provisions as outlined in the PNNL Operating Procedure for the 325 Building, in effect at the date of the transfer. With exception to, and in addition to, the packaging and transporting operations, shall be as follows:

The acceptance of all dangerous waste received at the 325 TSD Units will be dependent upon their packaging. Liquid waste containers accepted from other buildings to the 325 HWTUs shall have secondary containment with absorbent materials packed around the contents.

3.10.2 Response to Significant Discrepancies

The primary concern during acceptance of containers for storage is improper packaging or waste-tracking form discrepancies. Containers with such discrepancies are not accepted at the 325 HWTUs. Depending on the nature of the condition, such discrepancies can be resolved through the use of one or more of the following alternatives.

- Incorrect or incomplete entries on the Uniform Hazardous Waste Manifest or the onsite waste-tracking form can be corrected or completed with concurrence of the onsite generator or offsite generator. Corrections are made by drawing a single line through the incorrect entry. Corrected entries are initialed and dated by the individual making the correction.

- The waste packages can be held and the onsite generator or offsite waste generator requested to provide written instructions for use in correcting the condition before the waste is accepted.
- Waste packages can be returned as unacceptable.
- The onsite generator or offsite waste generator can be requested to correct the condition on the Hanford Facility before the waste is accepted.
- If a noncompliant dangerous waste package is received from an offsite waste generator, and the waste package is nonreturnable because of condition, packaging, etc., and if an agreement cannot be reached among the involved parties to resolve the noncompliant condition, then the issue will be referred to DOE-RL and Ecology for resolution. Ecology will be notified if a discrepancy is not resolved within 15 days after receiving a noncompliant shipment. Pending resolution, such waste packages, although not accepted, might be placed in the 325 HWTUs. The package(s) will be segregated from other waste.

3.10.3 Provisions for Non-Acceptance of Shipment

Before waste is brought into the 325 HWTUs, all associated documentation is inspected and verified for treatment and/or storage authorization. Any transfer of materials that the 325 HWTUs are not designed to treat and/or store neither are unloaded from the vehicle nor accepted for treatment or storage.

3.10.4 Activation of Contingency Plan for Damaged Shipment

If waste transfers arrive at the 325 HWTUs in a condition that presents a hazard to public health or the environment, the building emergency plan is implemented as described in Attachment 36, Chapter 7.0.

3.10.5 Tracking System

Upon generation or receipt into the 325 HWTUs, each container of waste is assigned a unique tracking number. This number is used to track the following information:

- a description and the quantity of each dangerous waste received and the method(s) and date(s) of storage or treatment in the 325 HWTUs, in accordance with WAC 173-303-380(2)
- the location of each dangerous-waste container stored in the unit and the quantity at each location, including cross-reference to any applicable manifest and/or waste-tracking numbers
- waste-analysis results.

This system effectively tracks waste containers as the containers move through treatment or storage at the 325 HWTUs. The information is retained as part of the 325 HWTUs operating record.

Sample-container selection is crucial to sample quality. When considering waste compatibility, durability, volume, and analytical sensitivities, the containers listed in Table 3.1 are recommended.

Table 3.3. Summary of Test Parameters, Rationales, and Methods

Waste-management unit type	Waste parameter	Media type	Rationale for selection
Containers	PH	L, SI	Identify waste that might compromise containers. RLWS waste-acceptance criteria for liquids.
	Flash point	L	Identify appropriate storage conditions (i.e., compatible waste storage). RLWS waste-acceptance criteria for liquids.
	Total and amenable cyanide or sulfide	L, SI, So	Identify potential reactivity and appropriate storage conditions.
	Halogenated hydrocarbon content	L, So	Identify constituents for compliance with Hanford Facility RCRA Permit.
	Polycyclic aromatic hydrocarbon content	L, So	Identify constituents for compliance with Hanford Facility RCRA Permit.
	Free liquids	SI	Identify/verify land-disposal restrictions for liquid waste.
	PCBs	L, So	Identify constituents for compliance with Hanford Facility RCRA Permit.
	Reactivity	L, SI, So	Identify potential reactivity and appropriate storage conditions.
	Halides	L	RLWS waste-acceptance criteria.
	TCLP constituents	L, SI, So	Identify constituents for compliance with Hanford Facility RCRA Permit.
Tanks	PH	L, SI	Identify waste that might compromise tank-system integrity. RLWS waste-acceptance criteria for liquids.
	Flash point	L	Identify appropriate storage conditions (i.e., compatible waste storage). RLWS waste-acceptance criteria for liquids.
	Total and amenable cyanide or sulfide	L, SI, So	Identify potential reactivity.
	Reactivity	L	Identify potential reactivity.
	Halides	L	RLWS waste-acceptance criteria.
	TCLP constituents	L	Identify constituents for compliance with Hanford Facility RCRA Permit.

L = liquid
PCB = polychlorinated biphenyls
RLWS = radioactive liquid waste system
SI = sludge
So = solid
TCLP = toxicity characteristic leaching procedure

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Figure 3.1. Floor Plan of SAL

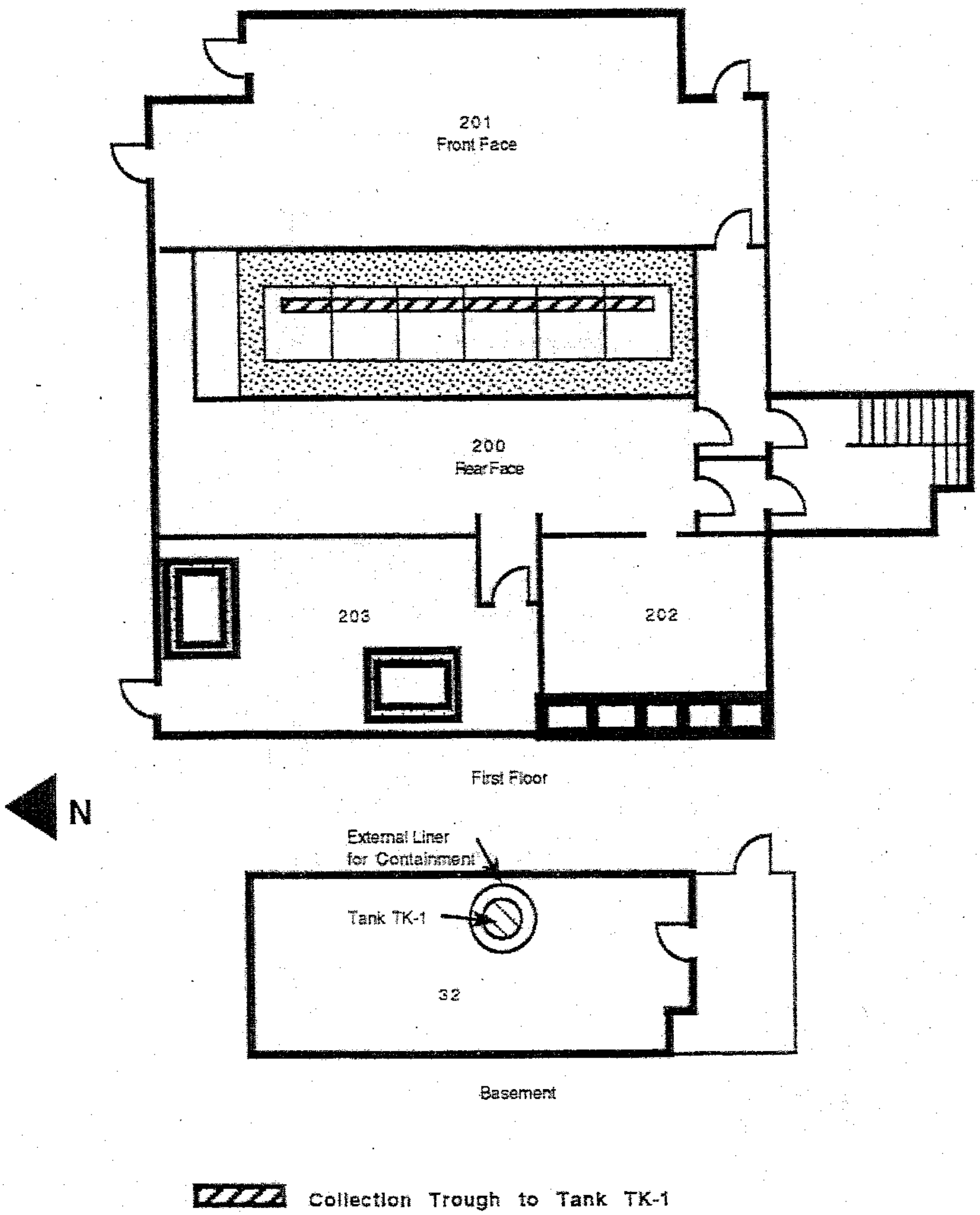
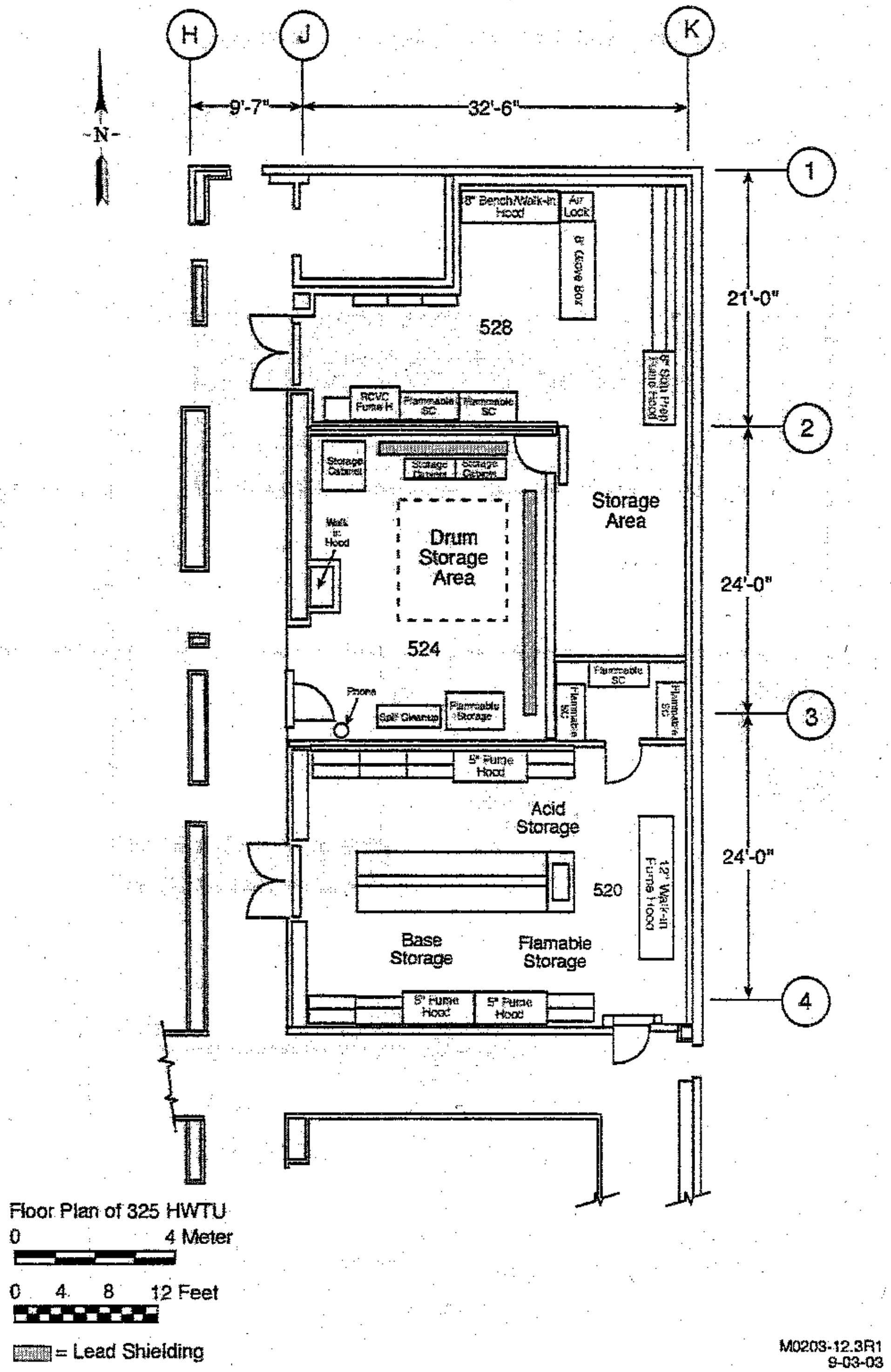


Figure 3.2. Drawings of the TSD Units



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4.0 PROCESS INFORMATION

This chapter provides a description of waste management, equipment, treatment processes, and storage operations.

The 325 HWTUs receive and treat and/or store wastes described in Chapter 3.0 (Waste Analysis Plan). Small-volume containers are segregated by compatibility and stored until sufficient quantity is accumulated to prepare a labpack or bulk container (usually a 208-liter (55 gallon) drum.) Waste introduced into the SAL tank is containerized for further management as described in Section 4.2.1. Containers are repackaged for shipment as necessary and manifested for shipment to a permitted onsite or offsite TSD facility for any necessary further treatment and compliant disposal.

4.1 CONTAINERS

The following sections describe the management of dangerous waste in containers at the 325 HWTUs. Container management occurs at both the HWTU and the SAL. Both portions of the 325 HWTUs are used to store and treat dangerous wastes generated from onsite programs, primarily research laboratory analytical activities in the 325 Building and other PNNL facilities. Containers are then prepared for shipment to other TSD facilities for further treatment as required and compliant disposal. Descriptions of the containers used are provided in the sections that follow for the HWTU and SAL.

4.1.1 Containers Located in the Hazardous Waste Treatment Unit

Rooms 520, 524 and 528 of the HWTU are used to store and treat dangerous waste generated primarily from laboratory operations throughout the 325 Building and the Hanford Facility. The containers used to store and treat dangerous waste vary widely from original manufacturer containers to laboratory glassware for sample analysis or to 322-liter containers used to overpack smaller containers. Containers used for storage or treatment of dangerous waste are compatible with the waste stored in them. Acceptable containers for acidic waste include plastic, steel lined with plastic, glass, and fiberglass containers. Acceptable containers for other waste include steel, glass, fiberglass, plastic, and steel lined with plastic. Table 4.1 provides an example of the types of containers that could be used in the HWTU rooms, including the material of construction and the capacity of the container.

All containers of dangerous waste are labeled to describe the contents of the container and the major hazards of the waste as required under WAC 173-303-395. Each container is assigned a unique identifying number. All containers used for onsite transfer are selected and labeled according to any applicable regulations, including 49 CFR as required by WAC 173-303-190.

All flammable liquid waste is stored in compatible containers and in Underwriter's Laboratory (UL)-listed and Factory Mutual (FM)-approved flammable storage. Solid chemicals are stored on shelving or in drums in specifically designated areas based on the hazard classification.

4.1.1.1 Shielded Analytical Laboratory Containers

The primary function of the SAL is to conduct analysis of samples of waste streams collected at various locations on the Hanford Facility. The types of containers used to store dangerous waste in the SAL can vary widely from the original containers to laboratory glassware for sample analysis to 322-liter containers used to overpack smaller containers.

The containers used for storage or treatment of dangerous waste are compatible with the waste stored in the containers. Acceptable containers for acidic waste include plastic, steel lined with plastic, glass, and fiberglass containers. Acceptable containers for other waste include steel, glass, fiberglass, plastic, and steel lined with plastic. Table 4.1 provides an example of the types of container that could be used in the SAL, including the material of construction and the capacity of the container.

Rooms 32, 200, 201, 202, and 203 are used to store dangerous waste in containers. The back face of the SAL is typically used to store waste in the larger containers. These containers include various types of 208-liter steel containers (lined and unlined). Because of the nature of some mixed waste being stored at the SAL, it is often necessary that these standard 208-liter containers be modified. This modification ensures that the containers are specially shielded to be compliant with the ALARA criteria. These specially designed shielded containers are packaged to contain anywhere from 3.79 liters to 53 liters of waste depending on the amount of shielding required. The solid waste typically is packed in individual 3.79-liter to 4.73-liter containers before placement in the 208-liter shielded container. The shielding is accomplished by surrounding the small containers with concrete, lead, or other materials.

All containers of dangerous waste are labeled to describe the contents of the container and the major hazards of the waste as required under WAC 173-303-395. Each container is assigned a unique identifying number. All containers used for onsite transfer are selected and labeled according to any applicable regulations, including 49 CFR are required by WAC 173-303-190.

All flammable liquid waste is segregated from any incompatible waste types and packaged in approved containers.

4.1.2 Container Management Practices

Management practices and procedures for containers of dangerous waste ensure the safe receipt, handling, preparation for transfer, and transportation of the waste. The following sections describe the container management practices used for the HWTU and the SAL. Table 4.1 lists the typical containers used in the 325 HWTUs.

4.1.2.1 Hazardous Waste Treatment Unit Container Management Practices

Dangerous waste containers are inspected for integrity and adequate seals before being accepted at the HWTU. Waste received for storage and treatment from outside Rooms 520, 524 and 528 is either picked up by HWTU personnel or moved to Rooms 520, 524 and 528 in containers suitable for the waste. Depending on the container weight, size or number of containers to be moved, container(s) of dangerous waste are hand carried or moved on a platform or handcart, as appropriate, to Rooms 520, 524 or 528. 325 HWTUs staff moves the dangerous containers in accordance with 325 HWTUs collection procedures that address safety and hazard consideration. These procedures cover various waste types and transportation modes. Unsupervised 325 HWTUs staff does not perform the operations, covered by a procedure, until they are formally trained on the procedure.

Containers in poor condition or inadequate for storage (e.g., damaged, not intact, or not securely sealed to prevent leakage) are not accepted at Rooms 520, 524 and 528. Examples of acceptable packaging include laboratory reagent bottles, U.S. Department of Transportation-approved containers, spray cans, sealed ampules, paint cans, leaking containers that have been over packed, etc. Unit operations personnel have the authority to determine whether a container is in poor condition or inadequate for storage using the criteria of WAC 173-303-190 and to use professional judgment to determine whether the packaging could leak during handling, storage, and/or treatment.

Inspection of Containers. A system of daily, weekly, monthly, and yearly inspections are in place to ensure container integrity, and to check for proper storage location, prevent capacity overrun, etc. Inspections are detailed in Attachment 36, §6.2. Containers are inspected for integrity before acceptance at or transport to the HWTU. Containers found to be in poor condition or inadequate for storage are not accepted.

Container Handling. All HWTU staff is instructed in proper container handling and spill prevention safeguards as part of their training (Attachment 36, Chapter 8.0). Containers are kept closed except when adding or removing waste in accordance with WAC 173-303-630(5)(a). All personnel are trained and all operations are conducted to ensure that containers are not opened, handled, or stored in a manner that would cause the container to leak or rupture. All flammable cabinets containing dangerous waste are maintained with a minimum of 76 centimeters of aisle space in front of the doors. In room 520, the walk-in fume hood containing the 208-liter containers is designed to hold four 208-liter containers and has over 76 centimeters of aisle space; the containers are not stacked in the hood. In room 524, the walk-in fume hood containing the 208-liter containers is designed to hold two 208-liter containers and has over 76 centimeters of isle space in front of the doors; the containers are not stacked in the hood. Waste-handling operations can be conducted only when two or more persons are present in the unit or when the personnel present have immediate access to a communication device such as a telephone or hand-held radio.

4.1.2.2 Shielded Analytical Laboratory Container Management Practices

Containers are not opened, handled, or stored in a manner that would cause the containers to leak or rupture. Containers will remain closed except when sampling, adding, or removing waste; or when analysis or treatment of the waste is ongoing. Containers of incompatible waste are segregated in the storage areas. In-cell containers will be stacked no more than four high and labels will not be obscured.

Inspection of Containers. A system of daily, weekly, monthly, and yearly inspections are in place to ensure container integrity, and to check for proper storage location, prevent capacity overrun, etc. Inspections are detailed in Attachment 36, §6.2. Containers are inspected for integrity before acceptance at or transport to the SAL. Containers found to be in poor condition or inadequate for storage are not accepted.

Container Handling. All personnel are instructed in proper container-handling safeguards as part of their training (Attachment 36, Chapter 8.0). Containers are kept closed except when adding or removing waste in accordance with WAC 173-303-630(5)(a).

All container handling in the hot cells must be performed remotely with manipulators. Waste samples managed in the SAL enter the cells through rotating transfer wheels located in the back walls of cells 1, 2, and 6 and through a 17.8-centimeter borehole in the back wall of cell 1. Waste samples are moved into and out of the cells at these locations according to approved procedures that vary with ALARA concerns with the sample. After analysis of the sample and necessary confirmation of results, compatible solid waste samples are consolidated into appropriate size containers often referred to as 'paint cans' and usually stored in cell 1. However, any of the cells can be used for storage of waste during operations.

After evaluation for treatment and the subsequent treatment, liquid waste is either transferred to the SAL tank (discussed in §4.2) or solidified and repackaged into shielded 208-liter containers and stored in the back face area of the SAL. Waste generated outside of the hot cells is placed into appropriately sized containers and stored until packaged for shipment or transfer. Waste-handling operations are conducted outside of the cells only when a minimum of two persons are present in the unit or when the personnel present has immediate access to a communication device such as a telephone or hand-held radio.

4.1.3 Container Labeling

Once the material has been designated as a dangerous waste, all containers are marked and/or labeled to describe the content of the container as required by WAC 173-303-395. Containers also are marked with a unique identifying number assigned by the generating unit. All containers used for transfer of dangerous waste are prepared for transport in accordance with WAC 173-303-190.

4.1.4 Containment Requirements for Storing Containers

A description of secondary containment system design and operation is provided for the HWTU and SAL in this section.

4.1.4.1 Secondary Containment System Design and Operation for the Hazardous Waste Treatment Unit

The secondary containment system for the HWTU has three primary components: uniform fire code-approved flammable liquid storage cabinets, the floor of the rooms, and the firewater containment system (Figure 4.1).

Dangerous waste in containers of 65 liters or less is stored in Room 520 in steel flammable storage cabinets located in a storage room that forms the northeast corner of the room. An additional flammable storage cabinet is located beneath a stainless steel ventilated hood located along the south wall of Room 520. Containers over 65 liters may be stored in a hood located along the east wall of the room or on the floor of the unit, as noted below. The containers are made of stainless steel or other suitable material depending on the characteristics of the waste and are kept closed except when waste is being added or withdrawn.

Dangerous waste in containers of 20 liters or less is stored in Room 524 in steel storage cabinets or DOT approved containers providing secondary containment awaiting packaging. Flammable liquids will be stored in the flammable storage cabinet located along the south wall. Larger waste containers that contain liquids are stored in DOT approved containers providing secondary containment. These containers are then placed in a portable secondary containment system. Containers holding waste not subject to containment system requirements will be stored on the floor.

Dangerous waste in containers of 65 liters or less is stored in Room 528 steel storage cabinets in accordance with WAC 173-303-395(1)(a) and the Uniform Building Code (ICBO 1991). There are eight storage cabinets, four for flammable waste and four for corrosive waste. Two cabinets (one flammable storage cabinet and one corrosive storage cabinet) are located along the north wall of the room. Two cabinets for corrosive waste are located along the east wall. Two cabinets for flammable waste are also located along the south wall. Further storage is provided by a flammable cabinet located beneath a stainless steel ventilated hood on the east wall of the room. Each cabinet is clearly marked as containing either flammable or corrosive waste. Flammable waste cabinets are painted yellow, and corrosive cabinets are painted blue.

Liquid wastes in containers from 65 to 328 liters (17 to 85 gallons) capacity will be placed within drip pans or similar secondary containment devices. Containers from 65 to 328 liters (17 to 85 gallons) capacity holding only wastes that do not contain free liquids, do not exhibit either the characteristic if ignitability or reactivity as described in WAC 173-303-090(5) or (7), and are not designated as F020, F021, F022, F023, F026, or F027 will be stored in DOT approved drums on the floor within the unit.

Rooms 520 and 528 are located on the main floor of the 325 Building and are constructed of concrete. The concrete floors of both rooms have been equipped with a heat-sealed seamless chemical-resistant polypropylene coating that covers the entire floor area of both rooms and laps approximately 10 centimeters up all of the outside walls of each room. The coated floor is capable of containing minor spills and leaks of liquid mixed waste.

Major spills or leaks of liquid mixed waste flow into the firewater containment system. The firewater containment system consists of floor trenches located at each entrance to 520 and 528 and the firewater containment tank located in the basement of the building. The system is designed to collect the fire-suppression water in the event that the automatic sprinkler system was activated. The location of the trenches is shown in Figure 4.1.

The floor trenches located under the double doors on the west side of Rooms 520 and 528 are approximately 20 centimeters wide, 46 centimeters deep and 1.91 meters long. The floor trench located under the single south door of Room 520 is approximately 20 centimeters wide, 46 centimeters deep, and 1.5 meters long. The floor trench located under the single southwest door of Room 528 is 20 centimeters wide, 61 centimeters deep, and 1.5 meters long. The trenches extend completely across the entrance of each room so that liquids do not flow out through a doorway. The trenches are constructed of 14-gauge stainless steel and are equipped with a steel grate cover. All seams are welded to ensure integrity. Trenches under the double doors are equipped with two drains in the bottom, and trenches located under single doors are equipped with one drain to allow liquid to drain from the trench through 15-centimeter-diameter carbon steel piping to the firewater containment tank.

The firewater containment tank is located beneath Room 520 in the basement of the 325 Building. The rectangular tank has dimensions of 1.65 meters by 2.25 meters by 1.92 meters and a capacity of 22,710 liters. The sides and floor of the tank are constructed of epoxy-coated carbon steel plate. The steel sides and floor provide support for the chemical-resistant polypropylene liner. The tank is secured to the concrete floor of the 325 Building basement with 1.3-centimeter bolts at 1.82-meter intervals.

The possibility of mixing incompatible waste in the containment system is minimized, because the number of containers open at one time will be limited to those in process (waste not in process is stored in closed containers). In addition, the very large volume of any firewater flow would dilute waste and would minimize the possibility of adverse reactions.

4.1.4.2 Secondary Containment System Design and Operation for the Shielded Analytical Laboratory

The secondary containment in the SAL is divided into three systems: the six hot cells, the front face, and the back face. Figure 4.2 provides a first floor plan view depicting these three areas.

The secondary containment for the six hot cells consists of the stainless steel base of the cell and a continuous trough located on the east side of the cells. The hot cell secondary containment system is shown in Figure 4.2. The base and trough can collect leaks and spills generated during analytical chemistry operations. The stainless steel bases are approximately 0.55 square-meters. The troughs are approximately 15.2 centimeters wide, 7.6 centimeters deep, and extend across the entire 1.82-meter width of each cell. The troughs are equipped with a stainless steel grate cover. The leaks and spills are drained by gravity through drains in the bottom of the trough and through stainless steel piping to the SAL tank located in the basement (Room 32). The SAL tank is constructed of stainless steel and has a capacity of 1,218 liters. Design and operating specifications are provided in §4.2.

The secondary containment system for the back face of the SAL consists of shielded 208-liter containers and plastic containers. Solid mixed waste is packaged in containers (e.g., paint cans, bottles, and bags) before removal from the hot cells. Once removed from the hot cells, the containers are placed into specially designed, shielded 208-liter containers to provide secondary containment. Containers of liquid waste are placed into plastic containers that provide secondary containment and prevent spilled liquids from contacting other waste containers. Some containers are placed in shielded cubicles in Room 202 depending on container dose rates. The location of the cubicles is shown in Figure 4.2.

The secondary containment system for the front face of the SAL, which is minimally used to store mixed waste, is similar to the system for the back face. Containers holding liquid and solid mixed waste are placed into containers to provide secondary containment; the primary area for mixed waste storage is the fume hood.

4.1.5 Structural Integrity of Base

A description of the requirements for base or liner to contain liquid is provided in the following sections for the HWTU and the SAL.

4.1.5.1 Requirements for Base or Liner to Contain Liquids in the Hazardous Waste Treatment Unit

The floors in Rooms 520 and 528 have been equipped with the chemical-resistant polypropylene coating. All seams in the coating were finished by heat welding to ensure the integrity of the coating. The coating currently is free of cracks, gaps, and will be maintained that way throughout the life of the HWTU. The condition of the floor is inspected weekly as part of the inspection program (Attachment 36, Chapter 6.0). Floor coating assessment is carried out whenever the floor coating is observed to be chipped, bubbled up, scraped, or otherwise damaged in a manner that would impact the ability of the coating to contain spilled materials. Minor nicks and small chips resulting from normal operations are repaired periodically.

The floor coating holds spilled liquid until the liquid is cleaned up, or enters the drains in each room. Once the liquid has entered the drains, the liquid drains into the firewater containment tank in the basement, where the liquid is stored pending chemical analysis and treatment and/or disposal.

The base of the HWTU floors consists of 14.2 centimeter, reinforced, poured concrete slabs with no cracks or gaps. The concrete is mixed in accordance with ASTM 094, Section 5.3, Alternate 2, and is finished with a smooth troweled surface. The concrete base has a load capacity of 976 kilograms per square meter.

The floor trenches that prevent liquids from migrating from rooms 520 and 528 are constructed of 14-gauge stainless steel. All seams are welded and the connections with the drains are tight. The stainless steel is compatible with and resistant to the liquid mixed waste managed in the HWTU.

4.1.5.2 Requirements for Base or Liner to Contain Liquids in the Shielded Analytical Laboratory

The base currently is free of cracks, gaps, and will be maintained that way throughout the life of the SAL. The base of the floor for the six hot cells consists of a 0.48-centimeter layer of stainless steel formed on top of poured concrete. The stainless steel base is compatible with most of the waste generated in the hot cells. The exceptions are waste containing hydrofluoric acid and high concentrations of hydrochloric acids. This waste is stored in individual secondary containment to prevent contact of the waste with the stainless steel in the event that a primary waste container was to fail. Because the volumes of waste generated and stored are small and the hot cell floors are not sloped; waste spilled during waste handling activities probably would remain localized and be cleaned up expeditiously to ensure that no damage occurs to the stainless steel. As was previously discussed, a stainless steel tank provides the secondary containment system for the six cells. Liner and base requirements for the SAL tank are discussed in §4.2.

The bases of the back face and front face of the SAL consist of a 15.2 -centimeter, reinforced, poured concrete slabs with no cracks or gaps. The concrete base has a load capacity of 976 kilograms per square meter. The base in Room 201 is topped with a seamless chemical resistant polypropylene coating. Rooms 202 and 203 are topped with epoxy-based paint. Room 200 concrete slab is painted, and has a trap door in the painted floor that enables transfer of equipment between Rooms 200 and 32. The airflow between these rooms is from Room 200 to Room 32 due to positive air pressure in Room 200.

4.1.6 Containment System Drainage

A description of the containment system drainage for the HWTU and SAL is provided in this section.

4.1.6.1 Containment System Drainage for the Hazardous Waste Treatment Unit

The floors in Rooms 520 and 528 are not sloped. Small spills of liquid probably will remain in a localized area until the spills are cleaned up. Either all containers of dangerous waste are stored in drums, on shelves within open-faced hoods, or within flammable or corrosive storage-cabinets to prevent the containers from contacting spilled materials. Large spills of liquid material would spread laterally across the flat surface of the floor. The flow of the spilled liquid would be stopped by an outside wall(s) of the room or by one of the trenches protecting the entrances to the room. The lower 10 centimeters of the outside walls of the rooms are covered with the same chemical-resistant coating as that on the floor to prevent spills from migrating throughout the walls.

The floor in Room 524 is not sloped. All liquid waste in this room will be stored in secondary containment. The secondary containment for liquids will consist of steel storage cabinets with secondary containment, DOT approved containers or one of the stainless steel 'container pans'. Any container holding waste not subject to containment system requirements will be stored on the floor.

The floor drains across each exit in Rooms 520 and 528 drain spills to an emergency firewater containment tank (22,710-liter capacity) located in the basement of the 325 Building. The tank captures all drained liquid, where the liquid is stored until sampling and analysis indicates a proper treatment and/or disposal method.

4.1.6.2 Containment System Drainage for the Shielded Analytical Laboratory

The stainless steel base of the hot cell is not sloped. Because of the small volume of waste that is handled, small spills probably would remain in a localized area until the spills are cleaned up. As a result, all containers of liquid mixed waste are stored within secondary containment to prevent spilled liquids from contacting the containers. Large spills that occur within the SAL hot cells flow to the stainless steel trough at the front of each cell, which gravity drains into the SAL tank (TK-1, Room 32).

The bases of the front and back faces are not sloped. Containers in these areas are stored within secondary containment and off the base surface to prevent spilled liquids from contacting the containers.

4.1.7 Containment System Capacity

A description of the containment system capacity for the HWTU and SAL is provided in the following sections.

4.1.7.1 Containment System Capacity for the Hazardous Waste Treatment Unit

The maximum combined total volume of all containers of dangerous waste stored in both HWTU rooms is 10,000 liters. The largest mixed waste storage container is a 322-liter container. The firewater containment tank provides secondary containment for both HWTU rooms. The capacity of the firewater containment tank is 22,710 liters; therefore, the containment system is more than adequate to contain either 10 percent of the total volume of waste (2,840 liters) or the entire volume of the largest container (322 liters).

4.1.7.2 Containment System Capacity for the Shielded Analytical Laboratory

The SAL tank is considered the secondary containment for the hot cells. The largest quantity of liquid that could be stored in the hot cells while maintaining adequate (10 percent of total volume) secondary containment would be 12,491 liters. The total amount of liquid to be stored in the hot cells is governed by the area constraint of the cells. Typically, the largest amount of liquid waste to be stored in the hot cells at one time is 75.8 liters.

Liquid waste stored in Room 201 is stored in the fume hood. The waste is stored in glass or plastic bottles that are placed in individual plastic containers of a size that is sufficient to hold all of the contents of the inner vessel. The quantity of liquid waste stored in the hood is governed by the area constraint in the hood. Similarly, liquid waste stored in Room 202 is stored in glass or plastic bottles that are each placed in individual secondary containment.

The floors of the front face and back face are constructed of concrete. The rear face floor in Rooms 202 and 203 is covered with epoxy paint. Because of the small quantities of liquid stored in the front face and back face, any spill that is not contained by the plastic overpack probably would remain on the floor in a localized area until cleaned.

4.1.8 Control of run-on

Run-on control for the HWTU and SAL is described in the following sections.

4.1.8.1 Control of run-on for the Hazardous Waste Treatment Unit

The 325 Building mitigates the possibility of run-on for the HWTU. The level of the main floor is approximately 1.52 meters above the level of the ground surface around the building.

4.1.8.2 Control of run-on for the Shielded Analytical Lab

The 325 Building mitigates the possibility of run-on for the SAL. The level of the main floor is approximately 1.52 meters above the level of the ground surface around the building.

4.1.9 Removal of Liquids from Containment System

The removal of liquids from the containment system for the HWTU and SAL is described in the following sections.

4.1.9.1 Removal of Liquids from the Hazardous Waste Treatment Unit Containment System

On discovery of liquid accumulation in the containment resulting from a spill or other release, the Building Emergency Director (BED) must be contacted in accordance with the contingency plan (Attachment 36, Chapter 7.0). The BED may determine that the contingency plan should be implemented. If the incident is minor, and if the BED approves, removal of the liquid commences immediately following a safety evaluation. Appropriate protective clothing and respiratory protection will be worn during removal activities; an industrial hygienist could be contacted to determine appropriate personal protection requirements and any other safety requirements that might be required, such as chemical testing or air monitoring. In addition, ventilation of the spill area might be performed if it is determined to be safe and if appropriate monitoring of the air discharge(s) is performed.

Liquid spills are contained within the Room 520, 524 or Room 528 floor or within the firewater containment tank. Localized spills of liquids to the floor of the HWTU rooms are absorbed with an appropriate absorbent (after the appropriate chemical reaction has occurred to neutralize reactivity in the case of reactive waste or after neutralization has occurred in the case of corrosive materials). The absorbent material is recovered and placed in an appropriate container. The floor, cabinets, and any other impacted containers can be cleaned by dry rags, soap and water, or a compatible solvent, if necessary, to remove external contamination. Contaminated rags and other cleanup material are disposed of in an appropriate manner. If spilled materials in the HWTU reach the firewater containment tank, the material will be held in place until chemical analysis indicates an appropriate treatment and/or disposal method. The waste analysis procedures and analytical methods used to designate the spilled materials are described in Attachment 36, Chapter 3.0, Waste Analysis Plan. The tank is designed to allow easy access for material sampling. Depending on the results of the analysis, the collected spill material will be recovered and disposed of at an appropriate facility.

4.1.9.2 Removal of Liquids from the Shielded Analytical Laboratory Containment System

The removal of liquid from the SAL tank, which provides the secondary containment for the six hot cells, is discussed in §4.2. The tank will be emptied after the accumulated waste is designated.

On discovery of liquid accumulation in the back or front face containment resulting from a spill or other release, the BED must be contacted in accordance with the contingency plan (Attachment 36, Chapter 7.0). The BED could determine that the contingency plan should be implemented. If the incident is minor, and if the BED approves, removal of the liquid commences immediately following a safety evaluation. Appropriate protective clothing and respiratory protection will be worn during removal activities; an industrial hygienist could be contacted to determine appropriate personal protection requirements and any other safety requirements that might be required, such as chemical testing or air monitoring. In addition, ventilation of the spill area could be performed if it is determined to be safe and if appropriate monitoring of the air discharge(s) is performed.

Localized spills of liquids to the floor of the SAL will be absorbed with an appropriate absorbent (after the appropriate chemical reaction to neutralize reactivity has occurred in the case of reactive waste or after neutralization has occurred in the case of corrosive materials). The absorbent material will be recovered and placed in an appropriate container. The floor, cabinets, and any other impacted containers can be cleaned by dry rags, soap and water, or a compatible solvent, if necessary, to remove external contamination. Contaminated rags and other cleanup material will be disposed of in accordance with applicable regulations and PNNL internal waste management procedures.

4.1.10 Management of Ignitable and Reactive Waste in Containers

Management of ignitable and reactive-waste in containers within the HWTU and SAL is described in the following sections.

4.1.10.1 Management of Ignitable and Reactive Waste in Containers in the Hazardous Waste Treatment Units

Ignitable and reactive wastes are stored in compliance with Article 79, Regulations for Flammable and Combustible Liquids (ICBO 1997). Containers of ignitable and reactive waste are stored in individual flammable storage cabinets within the HWTUs.

4.1.10.2 Management of Ignitable and Reactive Waste in Containers in the Shielded Analytical Laboratory

Ignitable and reactive wastes are stored in compliance with Article 79, Regulations for Flammable and Combustible Liquids (ICBO 1997). Containers of ignitable and reactive waste are stored in individual flammable storage cabinets within the SAL.

4.1.11 Management of Incompatible Waste in Containers

The prevention of reaction of ignitable, reactive, and incompatible waste in containers for the 325 HWTUs is discussed in the following sections.

4.1.11.1 Management of Incompatible Waste in Containers at the Hazardous Waste Treatment Unit

Containers of ignitable and reactive waste are stored in segregated flammable storage cabinets. Attachment 36, §6.5.2, describes the methods used to determine the compatibility of dangerous waste so that incompatible waste is not stored together. Incompatible waste is never placed in the same container or in unwashed containers that previously held incompatible waste. Operations are conducted such that extreme heat or pressure, fire or explosions, or violent reactions do not occur. Uncontrolled toxic mists, fumes, dust, or gases in sufficient quantities to threaten human health or the environment are not produced; uncontrolled flammable fumes or gases in sufficient quantities to pose a risk of fire or explosion are not produced; and damage to the container does not occur. Information on the hazard classification of waste accepted by the HWTU is documented by the generating unit, which is carefully reviewed by HWTU personnel before waste acceptance. Mixing of incompatible waste is prevented through waste segregation and storage. As the containers received in the HWTU usually are smaller than 19 liters, the most common segregation is performed by storage of incompatible hazard classes in separate chemical storage cabinets. Guidance for the segregation is provided in Attachment 36, §6.5.2.

Minimum aisle space is maintained according to the Uniform Fire Code to separate incompatible waste. The possibility of adverse reaction is minimized (Attachment 36, §6.6 and §6.7 for methods used to prevent source of ignition).

4.1.11.2 Management of Incompatible Waste in Containers at the Shielded Analytical Laboratory

Incompatible waste in the SAL hot cells is managed by placing primary containers into a second container or tray capable of managing any leak or spilled material. Incompatible waste is never placed in the same container or in an unwashed container that previously held incompatible waste.

Treatment operations are conducted with minor amounts of waste to ensure that extreme heat or pressure, fire, or explosive or violent reactions do not occur. Potential releases would be controlled by the ventilation system that exhausts through two high-efficiency particulate air (HEPA) filters set in series, and due to the limited amount of waste in the SAL. These HEPA filters are part of the building exhaust system, which is maintained and inspected routinely in accordance with PNNL preventive maintenance standards. Emissions from the 325 Building stack, and control devices for those emissions, are regulated by the Washington State Department of Health pursuant to Chapter 246-247 WAC, and the Washington State Department of Ecology (Ecology) pursuant to Chapters 173-400, 173-401, and 173-460 WAC, respectively. Air-pressure barriers for containment control are achieved by supplying air from areas of least contamination (i.e., offices) to areas of higher contamination (i.e., cells). These systems ensure proper emission flow through the HEPA filters.

Because waste normally is treated in the SAL hot cells, human exposure to the remote potential of mixing incompatible waste or reactive waste is minimal. Waste generated and treated within the SAL hot cells is stored within separate secondary containers, which eliminates the potential for combining incompatible waste. Waste stored in the front or back face of the SAL is packaged by hazard classes for transfer or is segregated in separate secondary containment.

4.2 TANK SYSTEMS

The following sections describe the management of dangerous waste in the SAL tank system. The tank system consists of the tank; associated piping, valves and pumps; and secondary containment. The tank system is located in Room 32 of the SAL and is used to collect liquid waste generated from the analytical laboratory operations. This SAL tank system is described in §4.2.1.

4.2.1 Shielded Analytical Laboratory Tank System

The SAL is an analytical chemistry laboratory used primarily to prepare and analyze samples for research and development activities and waste characterization. As noted in Attachment 36, §3.3, storage in containers and bench-or small-scale treatment of dangerous waste also occurs in the SAL. This work is conducted in six inter-connected hot cells. Liquid waste generated during these operations is collected, treated if necessary and may be containerized or drained from the hot cells to the SAL tank located in Room 32 of the basement directly below the hot cells. A stainless steel trough, 15.2 centimeters wide by 7.62 centimeters deep, traverses the front of all six hot cells in which solution is poured. The trough is equipped with stainless steel grating to capture solids during solution pour. The trough collects any liquid waste poured from analytical chemistry operations, mixed waste treatment operations, other chemical and mixed waste stored in the hot cells, and spills or leaks. The liquid waste is transferred through a common stainless steel pipeline that drains into the SAL tank. The waste is treated as needed and batch transferred from the SAL tank to containers for disposal. The SAL tank volume is 1,218 liters and has a throughput of 10,000 kilograms per year.

4.2.1.1 Design, Installation, and Assessment of Tank Systems

The following sections discuss the design and installation of the SAL tank and provide information on the integrity assessment.

4.2.1.1.1 Design Requirements

Waste stored in the SAL tank has a pH between 7 and 12. The tank is constructed of 316L stainless steel. This material is compatible with any of the dangerous waste that is discharged to the tank.

The tank system design has been reviewed by an independent, qualified, registered professional engineer to verify that the strength of the material is adequate and that it can withstand the stress of daily operation. The professional engineer evaluation is included in the tank integrity assessment.

The SAL tank is a vertical double-shell tank supported by 3 legs and stands approximately 1.7 meters above the ground. The top head is a 0.95-centimeter-thick flat stainless steel plate. Both bottom heads are flanged and dished heads (torispherical), and the bottom height is 10.2 centimeters above ground. The inner shell is 107 centimeters outside diameter, the outer shell is 114 centimeters outside diameter, and each shell is 0.8-centimeter-thick stainless steel plate. The tank is located inside a containment pan that has a 203-centimeter diameter and is 51 centimeters high; the total volume of the pan is 1,648 liters. The pan provides for secondary containment of leaks from the tank, piping, and ancillary equipment and instruments located above the tank. Flanged and threaded connections are located within the containment boundary of the pan to capture any leaks that might occur from these connections. Outside the containment area, all connections are welded. There are no outlets, drainage or otherwise, on the bottom or sides of the tank.

Solution enters the tank through a gravity flow, welded drain line piped from the hot cells. The SAL sources that tie into this drainpipe includes: the hot cells, sink drain, hood drain via the sink drain, and floor drain. The cup sink drain and hood drain line is sealed off and is not in use. The drain line also functions as the tank vent that is exhausted by the hot cell exhaust system. A mixer is located on top of the SAL tank to provide agitation of the contents for sampling and washout purposes. Process water also is provided to the tank system for cleanout of the tank and associated piping. The solution is stored in the SAL tank, treated as needed and transferred to containers for final disposal.

The SAL tank is located in a controlled access room and is monitored from two operating panels. The smaller sample panel is located next to the SAL tank, and the second main control panel is located in Room 201, the main operating gallery. The sample panel provides control for activities related to pulling a sample, such as activating the sample pump and controlling process water, and monitoring the liquid level of the tank. The main control panel provides the operators with the ability to monitor and control the entire SAL tank system. The main control panel provides level indication, high, and high-high level annunciation and contains switches for controlling pumps, agitators, valves, etc. The SAL tank is instrumented with three types of level-monitoring devices. Two devices are wired into the annunciator at the main control panel to provide high-level alarms, and one high-level alarm annunciates at the annunciator board in the control room on the third floor. This control room is staffed 24 hours a day, 7 days a week. If a high-alarm situation occurs after normal working hour's operations personnel would be notified immediately by the alarm and would take corrective action according to procedure. The SAL tank system normally is operated on the day shift. Personnel occupy the main operating gallery in Room 201, where the personnel would be alerted to off-normal conditions on the main control panel. A high-level alarm also would deenergize the process water solenoid valves to the closed position on three water lines into the hot cells and on the process water lines to the SAL tank. The containment pan contains a conductivity element that alarms at the main control panel should solution be detected in the pan. Operating procedures require that inspections of the entire system be made daily when in use (Attachment 36, Chapter 6.0).

4.2.1.1.2 Integrity Assessments

An independent, qualified, registered professional engineer's tank integrity certification has been completed and will be submitted as a separate document.

Within three (3) months of final installation of the new tank, the Permittee shall submit to Ecology a written integrity assessment, which has been reviewed and certified by an independent, qualified, registered professional engineer, in accordance with WAC 173-303-810 (13)(a).

4.2.1.2 Secondary Containment and Release Detection for Tank Systems

This section describes the secondary containment systems and leak detection systems installed in the SAL.

4.2.1.2.1 Requirements for Tank Systems

The secondary containment system for the SAL Tank in Room 32 consists of two components. The SAL tank is a double-walled vessel and the outer tank provides secondary containment for the inner tank; and; a pan has been installed under the tank to provide secondary containment for the pumps, valves, and flanges located on the top of the tank. The pan also provides tertiary containment for the tank.

The existing drainpipe from the hot cells to the SAL tank is a single-walled, 5.1-centimeter welded stainless steel pipe. This piping is visually inspected for leaks on a daily basis when the tank system is in use, by means of a remote video system. Flanges in this piping and ancillary equipment are located so that secondary containment is provided by the SAL tank secondary containment pan. The 325 Building provides additional containment. The basement floors are concrete, and any liquid release remains in the immediate area until cleanup. The openings to the drains in the basement are elevated 10.2 centimeters above the floor; thus, any spill would remain in the basement until enough liquid collects to fill the entire basement to a 10.2-centimeter depth. The SAL tank can hold a maximum of 1,218 liters, and the entire contents of the SAL tank would fill an area of only 3.5 meters by 3.5 meters to a depth of 10.2 centimeters. Because the basement is larger than 3.5 meters square, the liquid from the SAL tank would not enter a drain opening. Details of the design, construction, and operation of the secondary containment system are described in the following sections.

4.2.1.2.2 Requirements for Secondary Containment and Leak Detection

The secondary containment has been designed to prevent any migration of waste or accumulated liquid from the tank system to the soil, groundwater, or surface water. The secondary containment system also can detect and collect releases of accumulated liquids. A zoom color television camera surveillance system allows for tank, ancillary equipment, and general Room 32 viewing. The camera, located in Room 32, is equipped with auxiliary lighting and mounted on a remote controlled pan and tilt head. The color monitor and camera controls are housed in a dedicated cabinet in Room 527 or 527A. The HWTU will have the option of either keeping the camera/monitor controls in Room 527, 527A, or moving it to another location for operational flexibility. By maintaining operational flexibility of where the camera controls are located, the HWTU can meet ALARA (As Low As Reasonably Achievable) requirements and minimize the expense of added HWTU training requirements.

The following is the system description.

<u>Materials of construction.</u> The tank and components are constructed of 316L stainless steel; this material is compatible with the aqueous waste being discharged to the tank. The waste has a pH between 7 and 12.

<u>Strength of materials</u>. The system design has been reviewed by an independent, qualified, registered professional engineer to verify that the strength of materials is adequate and that the tank can withstand the stress of daily operation (SAIC 1996). In addition, pressure relief valves are installed in each line exiting the SAL tank. In the event that there is a blockage in the pipe or tubing, pressure will not build up

in the lines. The pressure relief valves are set to 30 psi, which is well below the design strength of stainless steel pipe and tubing. Waste drains back into the SAL tank when a pressure relief valve opens.

Strength of foundation. The system design has been reviewed by an independent, qualified, registered professional engineer to verify that the strength of the tank mounting and foundation is adequate to withstand the design-basis earthquake (DBE). This ensures that the foundation is capable of providing support to the tank and will resist settlement, compression, or uplift.

Leak detection system description. The SAL tank is double walled, and a conductivity probe is installed in the annulus to detect any leak of liquid from the primary containment. If liquid is detected by the probe, alarms are sounded immediately in a local control panel located in Room 32 and in the main control room.

A pan installed beneath the SAL tank provides tertiary containment. The containment pan has a conductivity element that alarms at the main control panel if the presence of liquid in the pan is detected. The containment pan has a 203-centimeter diameter and a 51-centimeter height with a containment capacity of 1,648 liters. The containment pan will easily hold the total capacity of the 1,218-liter SAL tank plus any potential process water that might be released.

Removal of liquids from secondary containment. The tank secondary containment, the outer shell of the double-walled vessel, is designed to contain a liquid leak from the inner vessel until provisions can be made to remove the liquid. The liquid might not be removed within 24 hours because of the coordination that must take place in the 325 Building. A tube is installed in the tank annulus, extending to the bottom and is capped at the top. If liquid were detected in the annulus, the liquid could be removed by connecting a tube between the capped fitting and the transfer pump, which would pump out the liquid to appropriate containers.

A delay of greater than 24 hours in removing the liquid from the secondary containment poses no threat to human health or the environment, because the waste continues to be contained in a sealed vessel. In the event that the secondary containment should leak, the containment pan installed beneath the tank provides tertiary containment.

4.2.1.2.3 Secondary Containment and Leak Detection Requirements for Ancillary Equipment

Secondary containment for the SAL tank system ancillary equipment is provided by the containment pan below the SAL tank, by double-walled piping for the sample line between the tank and the sample station, and by daily visual inspection during use of the entire system including the existing single-walled piping. Flanged and threaded connections, joints, and other connections are located within the confines of the containment pan. Outside this pan, only double-walled piping and welded piping is allowed. The pumps are magnetic coupling pumps located above the pan. All construction material is stainless steel; for the welded parts, the material is 316L stainless steel. Stainless steel material is compatible with the expected corrosive, dangerous, and mixed waste stored in the SAL tank. The strength and thickness of the piping, equipment supports, and containment pan are designed to onsite standards that take into account seismic requirements for the region and corrosion protection. The entire system is located on an existing basement floor built in the 1960s. The 325 Building has proven over time to be of a sound structural integrity to withstand mild earthquake forces. The containment pan has a liquid element sensor that alarms immediately at the main control panel should any leakage be detected. The containment pan has a 203-centimeter diameter and a 51-centimeter height, or 1,648 liters of capacity. The containment pan will hold the total capacity of the 1,218-liter SAL tank plus any potential process water that also might be released. In the event of an alarm, the process water solenoid valves will become de-energized to the closed position to minimize the loss of additional water.

The 325 Building is staffed or monitored 24 hours a day, 7 days a week. The control system is designed to alarm on any leak/spill or high-level alarm encountered. The personnel responding to the alarm condition will stop or secure the action causing the leak/spill, warn others of the spill, isolate the spill area, and minimize individual contamination and exposure. The spilled or leaked waste will be removed in an expeditious manner according to procedures for cleaning up spills and leaks.

4.2.1.2.4 Controls and Practices to Prevent Spills and Overflows

The SAL tank system has been designed to account for safe and reliable operation to prevent the system from rupturing, leaking, corroding, or otherwise failing. The tank is provided with redundant-level instrumentation to monitor tank levels. Both capacitance- and conductance-level probes are used for level monitoring and alarming. The tank will alarm on high level and interlock the process water to fail close. The process water is supplied to both the hot cells and the tank system. The containment pan is equipped with a liquid-sensing element to detect the presence of liquid and alarms at the main control panel if liquid is detected. Normally, liquid is drained to the tank by operators pouring solution into the troughs in the hot cells. This operation is carried out in a "batch mode." If this operation sets off a high-level alarm, the operators stop pouring solution into the troughs. Even if this operation caused an alarm condition, no spill is expected, because the tank has sufficient freeboard to hold additional waste solution. The initial level alarm is set at 92 percent of full volume.

Trained personnel respond to spills by stopping or securing the action causing the spill, notifying others in the area of the spill, and following guidance provided in the 325 Building Emergency Plan and the 325 HWTUs Contingency Plan (Attachment 36, Chapter 7.0). Measures are in place to inspect the system daily.

4.2.1.3 Tank Management Practices

According to operating procedures, liquid waste is poured into the troughs. The troughs tie into the 5.08-centimeter drain header located under the hot cells. This drain header is sloped down to the SAL tank located in Room 32 of the basement. The existing drain header is the only method of introducing mixed waste solutions into this tank. The drain line is fully welded and is constructed of 316L stainless steel material. Because this drain line also serves as the SAL tank vent line, the SAL tank operates at the same pressure as that of the hot cells. The heating, ventilation, and air conditioning operating pressure for the hot cells, and therefore the SAL tank, is -1.27 centimeters water (vacuum). The SAL tank operates at slightly subatmospheric pressure, and no pressure controls are necessary for this tank system.

The SAL tank is fully monitored with tank-level instruments. A main control panel provides level status and high-alarm annunciation. Two control panels are provided with the SAL tank monitoring system. One control panel is located adjacent to the sampling station in Room 32 to control the sampling pump when samples are pulled. A second control panel is located on the operating floor in Room 201, the SAL main operating gallery. Tank status is monitored from the first floor control panel. Because waste solution is generated in a batch mode, waste solution drained to the tank is effectively controlled through operating and administrative procedures in order to prevent high-level-alarm conditions. A safety cutoff system for the tank will shut off all incoming water to the SAL in conjunction with a high-level-alarm condition. A backup tank system was determined to be unnecessary for the SAL operations because of the presence of tank monitoring devices and the use of administrative and operational (batch-processing) controls.

The tank transfer controls provide similar safety features. Once the SAL tank contains sufficient volume, the tank's solution is prepared for transfer to containers. After waste characterization is completed, the transfer is initiated.

4.2.1.4 Marking or Labeling

Due to the ALARA concerns associated with the SAL tank, the tank itself is not labeled. The tank is located in a locked room to comply with ALARA standards. Access points to the room are labeled to meet the requirements of WAC 173-303-395. The marking of the access points is legible from a distance of 15 meters and identifies the waste. The label adequately warns employees, emergency response personnel, and the public of the major risks associated with the waste being stored within the tank. The tank also has a written placard identifying important hazard concerns.

4.2.1.5 Ignitable, Reactive, and Incompatible Waste

Many different types of samples and waste materials will be brought to the SAL hot cells for analytical or research activities. These samples are accompanied by an internal PNNL documentation form that provides waste characterization information from the sample-generating unit. Chemical characterization provided in these forms is based on previous chemical analysis or process knowledge. The hazard potential includes exposure to mixed waste, corrosive chemicals, and hazardous chemicals. All operations performed in the SAL hot cells are conducted by qualified operators following approved procedures. Typical hot cell analytic processes generate liquid waste that is highly acidic and/or that have a high chloride level. A small quantity of organic waste is generated and segregated prior to treatment or disposal. If heavy metals are present in the liquid waste before neutralization, the metals are precipitated as hydroxides incident to the neutralization and are filtered from the solution. If the chloride content of the liquid is above 0.01 Molar, the chlorides may be removed through silver nitrate precipitation. Therefore, waste solutions are not expected to be ignitable, reactive, or incompatible when transferred to the SAL tank.

4.3 AIR EMISSIONS CONTROL

The TSD unit shall comply with all applicable Subpart AA and BB requirements of the Air Emission Standards. The air emissions standards on 40 CFR 265, Subpart AA and BB do not apply to any part of the 325 HWTUs. Containers in the 325 HWTUs are primarily managed as mixed waste. Such containers are exempt from 40 CFR 264, Subpart CC by 40 CFR 264.1080(6).

Table 4.1. Typical Storage Containers Used at the 325 Hazardous Waste Treatment Units

Material of construction	Waste Capacity
Glass container/bottles	1 milliliter to 3.79 liters
Plastic containers/bottles	1 milliliter to 19 liters
Paint cans	0.47 liters to 4.73 liters
Steel containers	114 liters, 322 liters
Plastic-lined steel containers	114 liters, 208 liters
Steel "shielded" 208-liter container	Various nominal capacity depending on necessary shielding; 3.79 liters; 53 liters
Overpack containers	322 liters

Figure 4.1. Hazardous Waste Treatment Unit Secondary Containment System

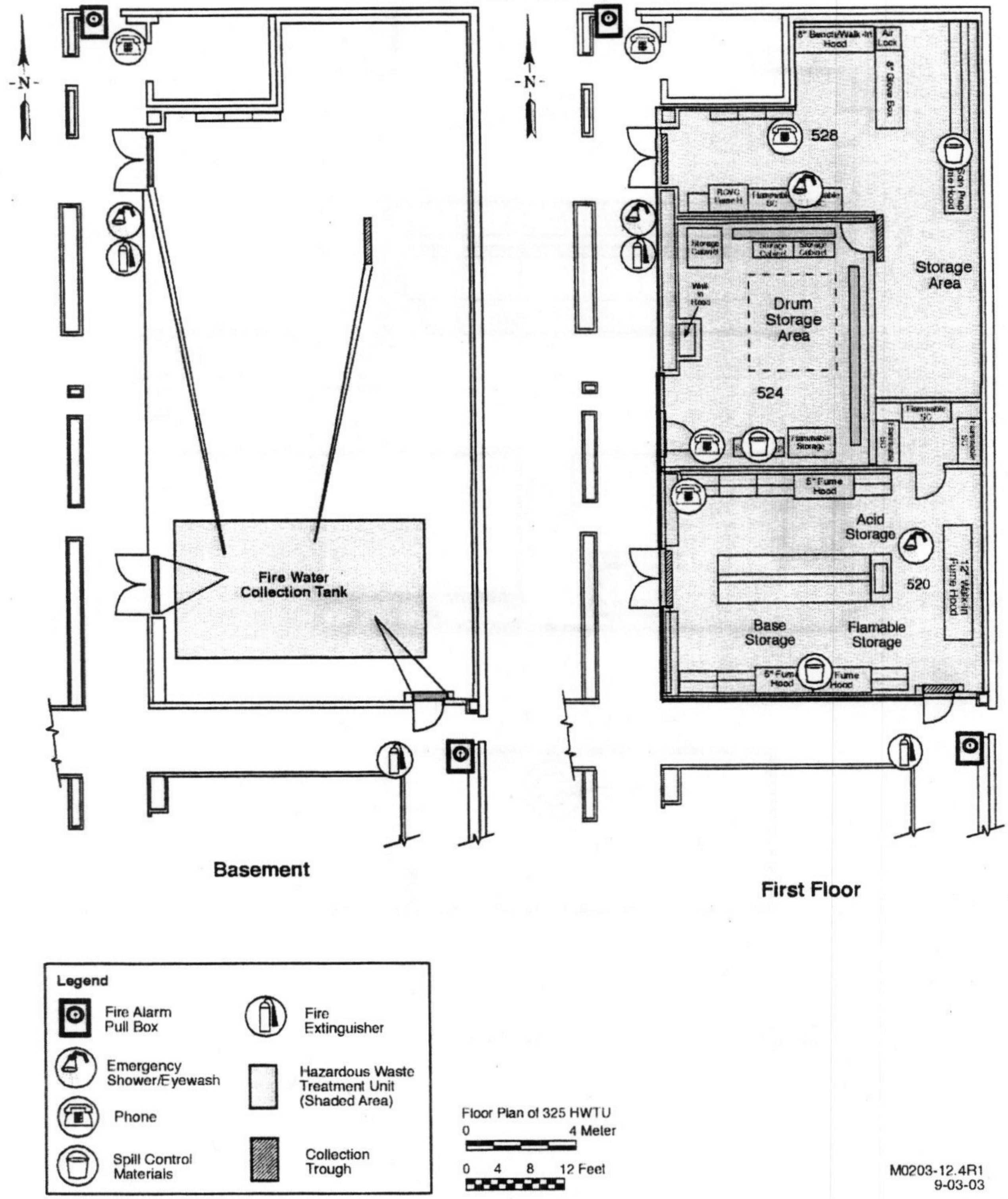
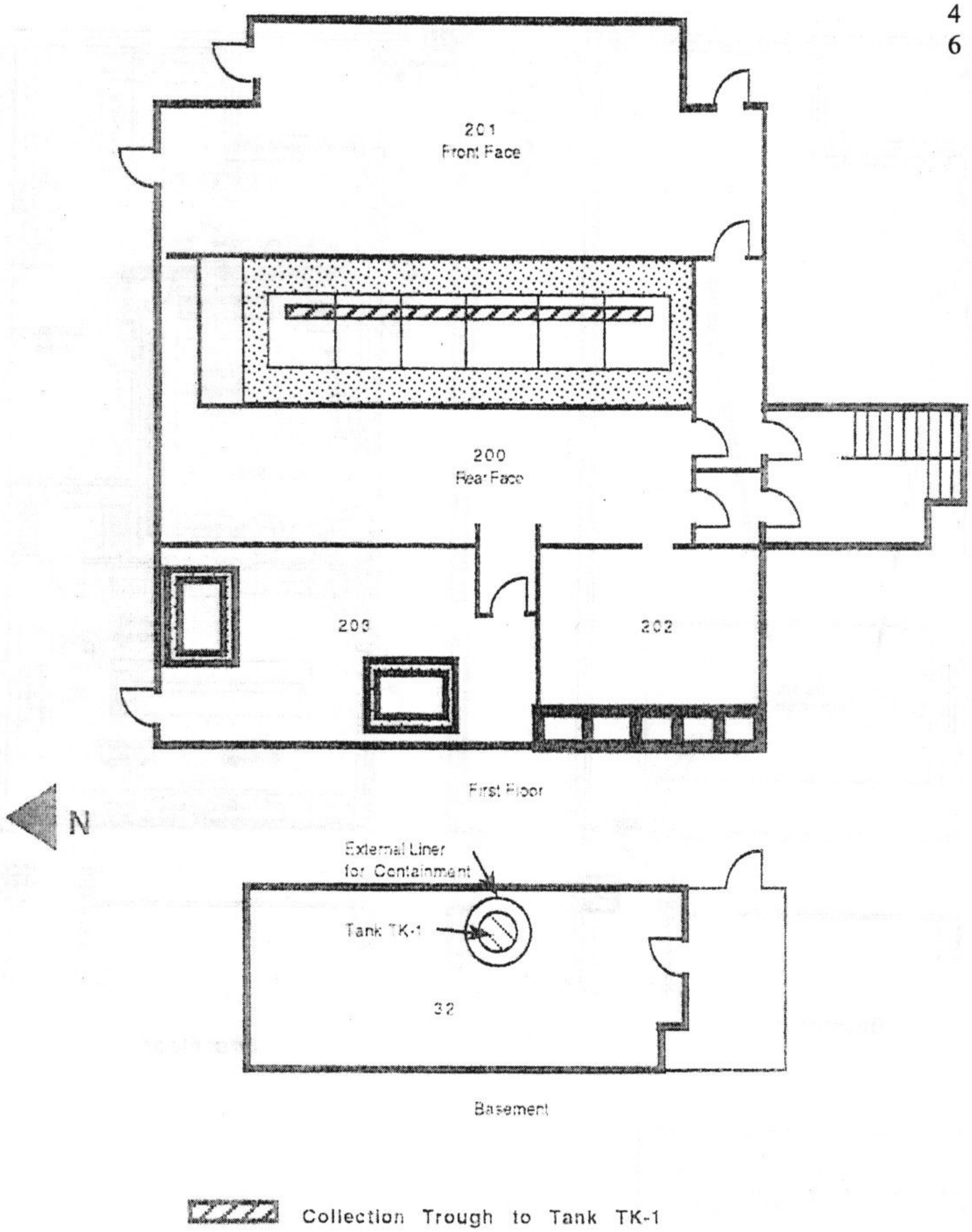


Figure 4.2. Hot Cell Secondary Containment System



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8.0 PERSONNEL TRAINING

This chapter discusses personnel training requirements based on WAC 173-303 and the HF RCRA Permit (DW Portion). In accordance with WAC 173-303-806(4)(a)(xii), the *Hanford Facility Dangerous Waste Part B Permit Application* must contain two items: (1) "an outline of both the introductory and continuing training programs by owners or operators to prepare persons to operate or maintain the TSD facility in a safe manner as required to demonstrate compliance with WAC 173-303-330" and (2) "a brief description of how training will be designed to meet actual job tasks in accordance with the requirements in WAC 173-303-330(1)(d)." The HF RCRA Permit, (DW portion) Condition II.C (Personnel Training) contains training requirements applicable to Hanford Facility personnel and non-Facility personnel.

Compliance with these requirements at the 325 HWTUs is demonstrated by information contained both in the HF RCRA Permit, Attachment 33, General Information Portion (DOE/RL-91-28), and this chapter. This chapter supplements Attachment 33, General Information Portion (DOE/RL-91-28), Chapter 8.0.

8.1 OUTLINE OF INTRODUCTORY AND CONTINUING TRAINING PROGRAMS

The introductory and continuing training programs are designed to prepare personnel to manage and maintain the TSD unit in a safe, effective, and environmentally sound manner. In addition to preparing personnel to manage and maintain TSD units under normal conditions, the training programs ensure that personnel are prepared to respond in a prompt and effective manner should abnormal or emergency conditions occur. Emergency response training is consistent with the description of actions contained in Attachment 36, Chapter 7.0, Contingency Plan. The introductory and continuing training programs contain the following objectives:

- Teach Hanford Facility personnel to perform their duties in a way that ensures the Hanford Facility's compliance with WAC 173-303
- Teach Hanford Facility personnel dangerous waste management procedures (including implementation of the contingency plan) relevant to the job titles/positions in which they are employed, and
- Ensure Hanford Facility personnel can respond effectively to emergencies.

8.1.1 Introductory Training

Introductory training includes general Hanford Facility training and TSD unit-specific training. General Hanford Facility training is described in Attachment 33, General Information Portion (DOE/RL-91-28), Chapter 8.0, Section 8.1, and is provided in accordance with the HF RCRA Permit (DW Portion), Condition II.C.2. TSD unit-specific training is provided to Hanford Facility personnel allowing those personnel to work unescorted, and in some cases is required for escorted access. Hanford Facility personnel cannot perform a task for which they are not properly trained, except to gain required experience while under the direct supervision of a supervisor or coworker who is properly trained. Hanford Facility personnel must be trained within 6 months after their employment at or assignment to the Hanford Facility, or to a new job title/position at the Hanford Facility, whichever is later.

General Hanford Facility training: Refer to description in Attachment 33, *General Information Portion* (DOE/RL-91-28), Chapter 8.0, Section 8.1.

Contingency Plan training: Hanford Facility personnel receive training on applicable portions of HF RCRA Permit, Attachment 4, *Hanford Emergency Management Plan* in general Hanford Facility training. In addition, Hanford Facility personnel receive training on content of the description of actions contained in contingency plan documentation in Attachment 36, Chapter 7.0 to be able to effectively respond to emergencies.

Emergency Coordinator training: Hanford Facility personnel who perform emergency coordinator duties in WAC 173-303-360 (e.g., Building Emergency Director) in the Hanford Incident Command System receive training on implementation of the contingency plan and fulfilling the position within the Hanford Incident Command System. These Hanford Facility personnel must also become thoroughly familiar with applicable contingency plan documentation, operations, activities, location, and properties of all waste handled, location of all records, and the unit/building layout.

Operations training: Dangerous waste management operations training (e.g., waste designation training, shippers training) will be determined on a unit-by-unit basis and shall consider the type of waste management unit (e.g., container management unit) and the type of activities performed at the waste management unit (e.g., sampling). For example, training provided for management of dangerous waste in containers will be different than the training provided for management of dangerous waste in a tank system. Common training required for compliance within similar waste management units can be provided in general training and supplemented at the TSD unit. Training provided for TSD unit-specific operations will be identified in the training plan documentation based on: (1) whether a general training course exists, (2) the training needs to ensure waste management unit compliance with WAC 173-303, and (3) training commitments agreed to with Ecology.

8.1.2 Continuing Training

Continuing training meets the requirements for WAC 173-303-330(1)(b) and includes general Hanford Facility training and TSD unit-specific training.

General Hanford Facility training: Annual refresher training is provided for general Hanford Facility training. Refer to description in Attachment 33, *General Information Portion* (DOE/RL-91-28), Chapter 8.0, Section 8.1.

Contingency plan training: Annual refresher training is provided for contingency plan training. Refer to description above in Section 8.1.1.

Emergency coordinator training: Annual refresher training is provided for emergency coordinator training. Refer to description above in Section 8.1.1.

Operations training: Refresher training occurs on many frequencies (i.e., annual, every other year, every 3 years) for operations training. When justified, some training will not contain a refresher course and will be identified as a one-time only training course. The TSD unit-specific training plan documentation will specify the frequency for each training course. Refer to description above in Section 8.1.1.

8.2 DESCRIPTION OF TRAINING DESIGN

Proper design of a training program ensures personnel who perform duties on the Hanford Facility related to WAC 173-303-330(1)(d) are trained to perform their duties in compliance with WAC 173-303. Actual job tasks, referred to as duties, are used to determine training requirements. The first step taken to ensure Hanford Facility personnel have received the proper training is to determine and document the waste management duties by job title/position. The second step compares waste management duties to general waste management unit training curriculum. If general waste management unit training curriculum does not address the waste management duties, the training curriculum is supplemented and/or on-the-job training is provided. The third step summarizes the content of a training course necessary to ensure that the training provided to each job title/position addresses associated waste management duties. The last step is to assign training curriculum to Hanford Facility personnel based on the previous evaluation. The training plan documentation contains this process.

Waste management duties include those specified in Section 8.1 as well as those contained in WAC 173-303-330(1)(d). Training elements of WAC 173-303-330(1)(d) applicable to the 325 HWTUs operations include the following:

Part I - Procedures for using, inspecting, repairing, and replacing emergency and monitoring equipment
Part II - Communications or alarm systems
Part III - Response to fires or explosions
Part IV - Shutdown of operations.

Hanford Facility personnel who perform these duties receive training pertaining to their duties. The training plan documentation described in Section 8.3 contains specific information regarding the types of training Hanford Facility personnel receive based on the outline in Section 8.1.

8.3 DESCRIPTION OF TRAINING PLAN

In accordance with HF RCRA Permit (DW Portion), Condition II.C.3, the unit-specific portion of the *Hanford Facility Dangerous Waste Permit Application* must contain a description of the training plan. Training plan documentation is maintained outside of the *Hanford Facility Dangerous Waste Part B Permit Application* and the HF RCRA Permit. Therefore, changes made to the training plan documentation are not subject to the HF RCRA Permit modification process. However, the training plan documentation is prepared to comply with WAC 173-303-330(2).

Documentation prepared to meet the training plan consists of hard copy and/or electronic media as provided by HF RCRA Permit (DW Portion), Condition II.C.1. The training plan documentation consists of one or more documents and/or a training database with all the components identified in the core document.

A description of how training plan documentation meets the three items in WAC 173-303-330(2) is as follows:

1. -330(2)(a): "The job title, job description, and name of the employee filling each job. The job description must include requisite skills, education, other qualifications, and duties for each position."

   Description: The specific Hanford Facility personnel job title/position is correlated to the waste management duties. Waste management duties relating to WAC 173-303 are correlated to training courses to ensure training is properly assigned.

   Only names of Hanford Facility personnel who carry out job duties relating to TSD unit waste management operations at the 325 HWTUs are maintained. Names are maintained within the training plan documentation. A list of Hanford Facility personnel assigned to the 325 HWTUs is available upon request.

   Information on requisite skills, education, and other qualifications for job title/positions are addressed by providing a reference where this information is maintained (e.g., human resources). Specific information concerning job title, requisite skills, education, and other qualifications for personnel can be provided upon request.

2. -330(2)(b): "A written description of the type and amount of both introductory and continuing training required for each position."

Description: In addition to the outline provided in Section 8.1, training courses developed to comply with the introductory and continuing training programs are identified and described in the training plan documentation. The type and amount of training is specified in the training plan documentation as shown in Table 8-1.

3. -330(2)(c): "Records documenting that personnel have received and completed the training required by this section. The Department may require, on a case-by-case basis, that training records include employee initials or signature to verify that training was received."

Description: Training records are maintained consistent with DOE/RL-91-28, Section 8.4.

Table 8.1. 325 HWTUs Training Matrix

	Training Category*					
Attachment 33, General Information Portion DOE/RL-91-28) Chapter 8.0, Training Category	General Hanford Facility Training	Contingency Plan Training	Emergency Coordinator Training	Operations Training		
325 HWTUs	Orientation Program	Building Emergency Plan	Building Emergency Director Training	Advanced Waste Management Training	Container Management	Tank System Management
Staff Position						
Technical Group Lead	X	X	X[1]	X	X	X[1]
HWTU Staff	X	X	X[1]	X	X	X[1]
Shielded Analytical Laboratories Staff	X	X	X[1]	X	X	X[1]

[1] Required for any staff that has been assigned these duties.

* Refer to the 325 HWTUs Training Plan for a complete description of coursework in each training category.

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11.0 CLOSURE AND FINANCIAL ASSURANCE

This chapter discusses the planned activities and performance standards for closure of the 325 HWTUs in accordance with the requirements of WAC 173-303-610. No postclosure activities currently are applicable or required because the 325 HWTUs are proposed to be clean closed.

To clean close the 325 HWTUs, it will be demonstrated that dangerous waste has not been left onsite at levels above the closure performance standard for removal and decontamination. Regulations and laws will be reviewed periodically and the closure plan modified as necessary. If it is determined that clean closure is not possible or is environmentally impractical, the closure plan will be modified to address required postclosure activities.

11.1 CLOSURE PLAN

The 325 HWTUs are planned to be clean closed.

11.1.1 Closure Performance Standard

The 325 HWTUs will be clean closed in a manner that will minimize the need for further maintenance and will eliminate postclosure release of dangerous waste or dangerous waste constituents. This standard will be met by removing dangerous waste and any dangerous waste residues from the units.

If the 325 Building ceases operations (i.e., utilities are disconnected and routine personnel access is not allowed), a decision will be made whether to implement this closure plan, or if continued operating authority will be sought.

After closure, the building areas formerly occupied by the HWTUs will be in a condition suitable for use in support of ongoing or future research and development activities. This use will be consistent with other land use activities in the 300 Area.

If there is any evidence of spills or leaks from the unit into the environment, further remediation will be deferred to the final disposition of the 325 Building. A postclosure monitoring plan will then be developed.

Clean closure decontamination standards for structures, equipment, bases, liners, etc., will be those specified for hazardous debris in 40 CFR 268.45, Table 1. The 'clean debris surface' will be the performance standard for metal and concrete surfaces. This standard is consistent with Ecology guidance (Ecology 1994b) for achieving clean closure.

Attainment of a 'clean debris surface' will be verified by a visual inspection in accordance with the standard that states:

A clean debris surface means the surface, when viewed without magnification, shall be free of all visible contaminated soil and hazardous waste except residual staining from soil and waste consisting of light shadows, slight streaks, or minor discolorations and soil and waste in cracks, crevices, and pits may be present provided that such staining and waste and soil in cracks, crevices and pits shall be limited to no more than 5 percent of each square inch of surface area. (40 CFR 268.45, Table 1).

Some unit equipment such as pumps, cartridge filters, and pipes may not be sufficiently visible for in-place contamination evaluation and waste designation. Equipment that cannot be designated in-place must be removed and then designated.

Equipment and structures will be decontaminated using the procedures in Sections 11.2.3 and 11.3.3. If decontamination is impracticable, components will be removed, designated, and disposed of. All residues resulting from decontamination will be sampled and analyzed as described in Sections 11.2.4 and 11.3.6 to determine whether they are dangerous waste. Residues containing listed waste, having dangerous waste characteristics, or exceeding dangerous waste designation limits will be managed in accordance with all applicable requirements of WAC 173-303-170 through 173-303-203. [Reference WAC 173-303-610(5)].

11.1.2 Closure Activities

This closure plan describes the steps necessary to perform final closure of the 325 HWTUs. Closure activities will involve removing dangerous waste from the units and decontaminating associated structures and equipment in the units as necessary. These activities, which are discussed in subsequent sections, could be implemented at any point during the life of the 325 HWTUs.

Partial closure could involve closing the SAL or the HWTU individually or closing a portion of a unit, such as the SAL tank system, which includes the tank; associated piping, valves and pumps; and the secondary containment. Except for the timing of the closure activities, these closure activities would remain identical to those described in this closure plan.

11.1.3 Maximum Extent of Operation

The 325 HWTUs consist of three units, all within the 325 Building, located in the 300 Area on the Hanford Facility. The SAL is located in Rooms 32, 200, 201, 202, and 203. The HWTU is located in Rooms 520, 524 and 528, and the firewater containment tank located in the basement beneath Room 520. The SAL represents the maximum extent of operations for the 325 HWTUs as indicated in Attachment 36, Chapter 1.0. If additional operations are added to the unit, the closure plan will be modified to reflect closure of the new areas.

11.2 CLOSURE OF THE HAZARDOUS WASTE TREATMENT UNIT

The following sections address the activities required to conduct closure of the HWTU.

11.2.1 Removing of Dangerous Waste, Disposal, or Decontamination of Equipment, Structures, and Soils

Steps for inventory removal, decontamination, and disposal of all dangerous waste containers, residues, and contaminated equipment are described in the following sections.

11.2.2 Removing Dangerous Waste

Closure or partial closure activities will be initiated by removal of the dangerous waste inventory present at the HWTU at the time of closure or partial closure. Inventory removal procedures will be identical to the waste handling, treating, packaging, and manifesting activities associated with normal permitted operations at the HWTU.

All dangerous waste will be placed in containers that meet specifications stated in Attachment 36, §4.1. To the extent possible, waste will be bulked into larger containers. If waste is bulked, containers will be emptied in compliance with WAC 173-303-160 so that the containers can be considered a solid nondangerous waste. Small-quantity laboratory chemicals that can't be bulked will be packaged in lab pack containers in compliance with the requirements of WAC 173-303-161. All containers of dangerous waste will be manifested and transferred to the custody of a dangerous waste transporter having a proper dangerous waste identification number. All containers of dangerous waste will be transferred to an appropriate onsite unit permitted to manage the waste and that will ensure proper handling and disposal.

Equipment and structural components in the HWTU requiring decontamination will be decontaminated using the methods described in Section 11.2.3. All waste residues resulting from decontamination will be sampled and analyzed as described in Section 11.2.4 to determine whether the residue is mixed waste, dangerous, or nonhazardous waste and to discern how to dispose of the waste properly. All residues will be removed from the units and transferred to a TSD unit having the necessary permits for proper treatment, storage, and/or disposal. Residues containing listed waste, having dangerous characteristics, or exceeding dangerous waste designation limits will be managed in accordance with all applicable requirements of WAC 173-303-170 through 173-303-203. [Reference WAC 173-303-610(5)].

11.2.3 Decontaminating Structures, Equipment, and Soil

All equipment and structures in dangerous waste storage and treatment areas will be decontaminated at the time of closure or partial closure except equipment and structures that exhibit a 'clean debris surface' before starting closure activities. These will be considered decontaminated and receive to further decontamination. Initial closure activities will entail decontamination of all piping and equipment that is known to have contacted the waste. Equipment and structures to be decontaminated include the following:

- Waste handling and treatment equipment
- Glove boxes
- Open-face hoods
- Storage cabinets
- Floors, walls, and ceilings of Rooms 520, 524 and 528
- Firewater containment tank (beneath Room 520).

Decontamination methods for equipment and structures will be selected from appropriate technologies (40 CFR 268.45, Table 1) such as washing with water, high-pressure water jet scarifiers, abrasive blasting, aquablasting, or mechanical concrete scrubbers and scarifiers. Following the decontamination process, a visual inspection will be conducted for monitoring the effectiveness of the decontamination work.

All equipment used for decontamination will be used exclusively within the HWTU during closure activities. When all structural and equipment decontamination is complete, and when the equipment is no longer necessary, the equipment will be decontaminated before final closure of the units. All cleaning and decontamination waste will be collected and analyzed as described in Section 11.2.4. Any disposable equipment will be placed in a container and disposed at an appropriate unit based on the status of the waste as dangerous, mixed waste, or nonhazardous. Dangerous waste placed in containers will be managed in accordance with Attachment 36, Chapter 4.0.

All waste-handling equipment in the HWTU will be decontaminated by washing with water or a solvent to a 'clean debris surface' as defined in Section 11.1.1. If additional decontamination is necessary, a decontamination technique will be selected from appropriate technologies (40 CFR 268.45, Table 1) such as high-pressure water wash. If adequate cleaning is not possible, the equipment will be disposed of as dangerous waste. The decision to dispose or decontaminate equipment will be made at the time of closure. The option that is the most environmentally and economically feasible will be chosen. Adequate decontamination will be determined by a visual inspection for a 'clean debris surface' as described in Section 11.1.1. All wastewater will be collected in sumps or portable containers, pumped to chemically compatible, closed-top containers, and transported and managed as described in Section 11.2.4.

The time required for decontamination of waste-handling equipment and the amount of wastewater generated by these methods will depend on the amount of equipment that needs to be decontaminated. At this time, minimal time and effort are anticipated. The wastewater to be generated through decontamination is not anticipated to exceed approximately 378 liters. The volume of solid waste generated will depend on the extent of decontamination necessary.

If a 'clean debris surface' is present at the time that closure activities are started, the area will be considered clean closed. In this case, housekeeping measures may be undertaken and could include sweeping, dusting, vacuuming, and wiping with soap and water. Brushing or sweeping will be used to clean up coarse debris. Vacuuming will be performed using a commercial or industrial vacuum equipped with a high-efficiency particulate air (HEPA) filter. The vacuum cleaner bag containing captured particulates will be disposed appropriately. Dust wiping will be done with a damp cloth or wipe (soaked with water) to remove dust from surfaces that cannot be decontaminated with a vacuum. The cloth or wipe also will be disposed appropriately. HEPA filters from installed equipment and vacuum cleaners will be designated and managed as described in Section 11.2.4. The volume of solid waste (e.g., personal protective clothing/equipment, wipes, HEPA filters, vacuum bags) generated will depend on the extent of decontamination necessary.

Minimal time will be required for setup of the decontamination equipment. Labor requirements for the process should be moderate. Minimal time also will be required for packaging debris, dismantling, and removing cleaning equipment. Small quantities of wastewater (only the contents of buckets used in the decontamination procedure) will be generated. However, if a clean debis surface is not present, more sophisticated decontamination methods will be implemented. The surfaces in the HWTU that do not have a 'clean debris surface' will be treated extensively using an appropriate decontamination technology such as water washing (40 CFR 268.45, Table 1). The contaminated surfaces will be decontaminated to remove all residues from the surfaces. The contaminated waste generated by this activity will be contained by the designed spill controls already in place for the unit (i.e., fire water containment tank and associated drain lines/sumps) or by disposable absorbent pads that might be placed around the area to be water washed. Pumps or vacuums will be used to empty the wastewater from the containment area into chemically compatible, closed-top containers. Containers of wastewater will be managed as described in Section 11.2.4.

Although this method will require more time than the dusting, vacuuming, and wiping procedures outlined previously, time requirements are still considered minimal for the water washing approach. Wastewater generated by this method is not anticipated to exceed 500 liters.

If necessary, further decontamination methods such as sandblasting or other appropriate technologies could be used effectively to clean contaminated structure surfaces. All residues from the decontamination effort will be collected for sampling and proper subsequent disposal as described in Section 11.2.5.4. Following completion of decontamination, additional visual inspections will be performed to determine that the 'clean debris surface' standard has been achieved. In the unlikely event that structures cannot be cleaned using the methods described, these structures might be demolished, removed, and managed as dangerous waste.

The collection sumps and secondary containment system will be decontaminated by water washing. Wastewater collected from the cleaning process in each sump and containment system will be pumped into chemically compatible, closed-top containers and analyzed as described in Section 11.2.4 to determine if the wastewater is a dangerous waste under WAC 173-303-070. If the wastewater is determined to be a dangerous waste, the wastewater will be managed and disposed at an appropriate permitted unit. If the wastewater is not a dangerous waste, the wastewater will be discharged to the 300 Area retention process sewer systems. The water washing of all sumps should take minimal time and should generate less than 500 liters of wastewater. Additional decontamination techniques such as grit blasting, scabbling, or chipping might be used if necessary. The volume of solid waste generated will depend on the extent of decontamination necessary.

The internal surface of the firewater containment tank will be visually inspected. If a 'clean debris surface' is present at the beginning of the closure process, the firewater containment tank will be considered clean closed. If the surface of the liner does not meet the 'clean debris surface' standard then the firewater containment tank for the HWTU and ancillary equipment could be flushed with water, and if flushed, the water could be tested for dangerous waste constituents. Detergents, solvents, or a dilute acid wash could be required to remove constituents from the tank. In all cases, the final decontamination rinse water will be tested. To demonstrate decontamination, the interior surface of the tank liner will be visually inspected to determine if the 'clean debris surface' standard has been achieved. If this proves to be impractical or impossible, the tank liner will be removed and disposed. Runoff of decontamination solutions and wastewater will be prevented either by performing cleaning activities within existing containment structures or within portable containment pans or by surrounding the decontamination area with plastic and absorbent pads.

If water flushing is unsuccessful at removing dangerous waste and dangerous waste constituents, other decontamination processes will be employed, including appropriate technologies such as aquablasting and high-pressure water jet scarifiers. The actual equipment used will consist of an appropriate combination of equipment that will be the most effective as determined by sampling results. Following the decontamination process, a visual inspection for a 'clean debris surface' will be conducted to monitor the effectiveness of the decontamination work.

Management of decontamination residues is provided in Section 11.2.4. The time requirements for decontamination of the tank are expected to be minimal, and wastewater generated by this procedure is not expected to exceed 757 liters.

All dangerous waste storage and treatment operations at the 325 HWTUs will be conducted indoors, which will minimize potential contamination of the soil and groundwater. Unit design and administrative controls minimize the possibility of loss of waste to the soil and contamination of the groundwater. The potential for degradation of surface water quality also is very low due to the building design and administrative controls employed. Additional details on spill prevention and emergency response are provided in Attachment 36, Chapter 7.0.

11.2.4 Management of Decontamination Waste from HWTU

Decontamination waste from the HWTU will be placed in containers and sampled to determine disposal requirements. Samples from each container will be analyzed for the following:

- Corrosivity using the methods described in EPA SW-846 (Methods 9040/9045)
- Ignitability using methods described in EPA SW-846 (Methods 1010/1020)
- Toxicity characteristic using the Toxicity Characteristic Leaching Procedure (TCLP) described in 40 CFR 261 Appendix II (Method 1311) [including analysis for metals; volatile organics; and semivolatile organics, which includes chlorinated pesticides, using methods identified in the waste analysis plan (Attachment 36, Chapter 3.0]

Other analyses might be performed based on process knowledge to determine the presence of a listed waste. The results of sample analyses will be used to determine how to dispose of decontamination waste. (Background levels will be determined by analysis of the tap water used for makeup of the decontamination solutions.) The results of the ignitability, corrosivity, and toxicity characteristic analyses will be used to determine if the waste is characteristic dangerous waste (WAC 173-303-090). Depending on designation, decontamination waste will be managed as follows:

- Dangerous waste – Manifested and shipped and/or transferred to a permitted TSD unit
- Mixed waste – Manifested and shipped to a TSD unit as available, or treated and disposed onsite

11.2.5 Inspection to Identify Extent of Decontamination/Removal and to Verify Achievement of Closure Standard

Attainment of a 'clean debris surface' will be verified by a visual inspection in accordance with the standard that states, *A clean debris surface means the surface, when viewed without magnification, shall be free of all visible contaminated soil and hazardous waste except residual staining from soil and waste consisting of light shadows, slight streaks, or minor discolorations and soil and waste in cracks, crevices, and pits may be present provided that such staining and waste and soil in cracks, crevices and pits shall be limited to no more than 5 percent of each square inch of surface area.* (40 CFR 268.45, Table 1).

Areas of degraded surface material, such as significant concrete cracking or heavily gouged steel, will be evaluated by non-destructive or destructive means to determine depth of significant surface defects, amount of contamination present in the defects, and to determine if environmental contamination has resulted from the material defect.

11.3 CLOSURE OF THE SHIELDED ANALYTICAL LABORATORY

The activities required for the closure of the SAL are described in the following sections.

11.3.1 Removing Dangerous Waste, Disposal and Decontamination of Equipment, Structures, and Soils

Steps for inventory removal, decontamination, or removal of all dangerous waste containers, residues, and contaminated equipment are described in the following sections.

11.3.2 Removing Dangerous Waste

Closure or partial closure activities will be initiated by removal of the dangerous waste inventory present at the SAL at the time of closure or partial closure. Inventory removal procedures will be identical to the waste handling, treating, packaging, and manifesting activities associated with normal permitted operations at the SAL.

At the SAL, liquid waste will be treated and packaged to meet requirements for disposal in onsite units. The contents of the SAL tank will be loaded into containers and managed in accordance with Section 11.2.2. Any other suitable RCRA-permitted units that might exist when the SAL tank is closed could be used as a storage alternative. Liquid waste handling, packaging, transportation, and manifesting procedures will follow those used during normal operation of the SAL.

Equipment and structural components in the 325 HWTUs will be decontaminated using appropriate methods described in Sections 11.2.3 and 11.3.3. If decontamination is impracticable, components will be removed, designated, and disposed of. All waste residues resulting from decontamination will be sampled and analyzed as described in Section 11.3.6 to determine whether the residue is mixed waste, dangerous, or nonhazardous waste and to discern how to dispose of the waste properly. All residues will be removed from the units and transferred to a TSD unit having the necessary permits for proper treatment, storage, and/or disposal. Residues containing listed waste, having dangerous characteristics, or exceeding dangerous waste designation limits will be disposed of properly.

11.3.3 Decontaminating Equipment, Structures, and Soils

All equipment and structures in dangerous waste storage and treatment areas will be decontaminated at the time of closure or partial closure except equipment and structures that exhibit a 'clean debris surface' before starting closure activities. These will be considered decontaminated and receive no further decontamination. Initial closure activities will entail decontamination of all piping and equipment that is known to have contacted the waste. Equipment and structures to be decontaminated include the following:

- Floors, walls, and ceilings of the SAL front face (Room 201), hot cells, back face (Rooms 200, 202, and 203), and associated airlocks
- Floors, walls, and ceiling of the basement of Room 32 in the SAL
- SAL tank and ancillary equipment
- Secondary and tertiary containment pans
- Interior surfaces of all secondary containment trenches.

Decontamination methods for equipment and structures will be selected from appropriate technologies such as washing with water, high-pressure water jet scarifiers, abrasive blasting, aquablasting, or mechanical concrete scrubbers and scarifiers. Following the decontamination process, a visual inspection for a 'clean debris surface' will be conducted to monitor the effectiveness of the decontamination work.

All equipment used for decontamination will be used exclusively within the units during closure activities. When all structural and equipment decontamination is complete, and when the equipment is no longer necessary, the equipment will be decontaminated before final closure of the units. All cleaning and decontamination waste will be collected and packaged as described in Section 11.3.6. Any disposable equipment will be containerized and disposed of based on the status of the waste as dangerous, nondangerous, or mixed waste.

Initial gross decontamination of the hot cells will be necessary before entry of personnel into the hot cells for the visual inspection of the cell liners. ALARA concerns in the cells will preclude personnel entry into the cells, and configuration of the cells precludes thorough visual inspection of the interior surfaces of the cells. This decontamination will be accomplished using high-pressure water sprays or other appropriate decontamination techniques operated by means of the manipulators.

If a 'clean debris surface' is present at the time that closure activities are started, decontamination procedures will consist of sweeping, dusting, vacuuming, and wiping with soap and water. Brushing or sweeping will be used to clean up coarse debris. Vacuuming will be performed using a commercial or industrial vacuum equipped with a HEPA filter. The vacuum cleaner bag containing captured particulates will be appropriately disposed. Dust wiping will be done with a damp cloth or wipe (soaked with water) to remove dust from surfaces that cannot be decontaminated with a vacuum. The cloth or wipe also will be appropriately disposed. The volume of solid waste generated will depend on the extent of decontamination necessary.

Moderate time will be required for setup of the decontamination equipment. However, labor requirements for the process will be extensive for areas with ALARA concerns, and will, at least initially, require remote operations. Moderate time also will be required for packaging debris, dismantling, and removing cleaning equipment. Moderate quantities of wastewater will be generated by this procedure. However, if a 'clean debris surface' is not present, more sophisticated decontamination methods will be implemented. The dangerous waste management portions of the SAL will be treated extensively using an appropriate decontamination technique (40 CFR 268.45, Table 1). The ceiling, walls, and floor will be treated by applying the decontamination technique to remove all residues from the surfaces. The contaminated waste generated by this activity will be collected in the SAL and will be managed as described in Section 11.3.6. The volume of waste generated by this procedure is anticipated to be on the order of 2,000 liters.

If necessary, more aggressive decontamination methods, such as sandblasting or other appropriate technologies, could be used effectively to clean contaminated structure surfaces. All residues from the decontamination effort will be collected for sampling and proper subsequent disposal as described in Section 11.3.6. Following completion of decontamination, additional visual inspections will be performed to determine that the 'clean debris surface' standard has been achieved. In the unlikely event that structures cannot be cleaned using the methods described, these structures might be demolished, removed, and managed as dangerous waste.

The hot cells in the SAL also include two other areas that might require decontamination. These are the storage rooms 200, 202 and 203 in the backside of SAL and the operating area (gallery). It is expected that the level of contamination will be minimal based on the operations performed. Accordingly, the level of the decontamination effort also is expected to be minimal. For example, decontamination efforts in the operating gallery might be limited to decontamination and removal of the fume hood. If a 'clean debris surface' is present at the time that closure activities are started, decontamination procedures will consist of sweeping, dusting, vacuuming, and wiping with soap and water.

All dangerous waste storage and treatment operations at the 325 HWTUs will be conducted indoors, which will minimize potential contamination of the soil and groundwater. Unit design and administrative controls minimize the possibility of loss of waste to the soil and contamination of the groundwater. The potential for degradation of surface water quality also is very low due to the building design and administrative controls employed. Additional details on spill prevention and emergency response are provided in Attachment 36, Chapter 7.0.

If contaminated soil is found and if practical, it may be excavated, removed, and disposed as dangerous waste. Extensive soil contamination may be deferred to the closure of the 325 Building and to the CERCLA RI/FS process for the 300-FF-2 and 300-FF-5 operable units.

11.3.4 Decontamination of Hot Cell Trough

The collection trough in the interconnected SAL hot cells will be decontaminated using an appropriate decontamination technique (40 CFR 268.45, Table 1). Any wastewater collected in each sump from the cleaning process will be collected in the SAL waste tank system and analyzed to determine if the wastewater is a dangerous waste. If the wastewater is a dangerous waste, it will be managed and disposed at an appropriate permitted facility. If the wastewater is not a dangerous waste, the wastewater will be discharged to an appropriate disposal facility. The decontamination of the hot cell collection trough should take moderate time and should generate less than 500 liters of waste. Additional decontamination techniques, such as grit blasting or chemical cleaning, could be used if necessary. The volume of solid waste generated will depend on the extent of decontamination necessary.

11.3.5 Decontamination of the Shielded Analytical Laboratory Tank System

The SAL tank and ancillary equipment, tank secondary containment, tank tertiary containment pan, and associated tank piping will be flushed with water; the water will then be tested for dangerous waste constituents. Detergents, solvents, or a dilute acid wash could be required to remove constituents. In all cases, the final decontamination rinse water will be tested to determine whether cleaning activities are effective. Run-off of decontamination solutions and wastewater will be prevented either by performing cleaning activities within existing containment structures or within portable containment pans or by surrounding the decontamination area with plastic and absorbent pads.

If water flushing is unsuccessful at removing dangerous waste and dangerous waste constituents, other decontamination processes will be employed, including appropriate technologies such as, aquablasting, sandblasting, and high-pressure water jet scarifiers. The actual equipment used will be selected based on what the sampling results indicate will be the most effective. Following the decontamination process, a visual inspection for a 'clean debris surface' will be conducted to monitor the effectiveness of the decontamination work.

Management of decontamination residues is provided in Section 11.3.6. The time requirements for decontamination of the SAL tank system are expected to be moderate, and wastewater generated by this procedure is not expected to exceed 1,200 liters. The volume of solid waste generated will depend on the extent of decontamination necessary.

On completion of decontamination activities, the SAL tank either will remain in place for other uses within the 325 Building, will be moved for other uses on the Hanford Facility, or will be demolished and disposed as scrap (if its usefulness is determined to be complete).

11.3.6 Management of Decontamination Waste from SAL

Decontamination liquid from the SAL hot cells will be accumulated in cell or in the tank and sent to a permitted facility. All nonliquid waste generated during decontamination operations and the equipment used (e.g., sandblast grit, personnel protective equipment and clothing, disposable equipment) will be collected in 208-liter, open-head containers and stored onsite. Samples of the waste could be collected and analyzed as described in Section 11.2.4.

11.3.7 Inspection to Identify Extent of Decontamination/Removal and to Verify Achievement of Closure Standard

Methods to demonstrate success of decontamination will be the same as described in Section 11.2.5 for the HWTU.

11.4 MAXIMUM WASTE INVENTORY

The 325 HWTUs are used to store and treat a variety of different research-and-operations-related dangerous waste. The maximum inventory of waste that could be present at any one time in the 325 HWTUs is constrained by the following factors.

- The maximum inventory of dangerous waste stored in containers will not exceed the limits listed in Attachment 36, Chapter 1.0
- The maximum inventory of dangerous waste in tank storage in the SAL will not exceed 1,218 liters in accordance with the design capacity of the SAL and Attachment 36, Chapter 1.0
- The total amount of dangerous waste at any one time will not exceed Uniform Building Code hazardous material quantity restrictions (Attachment 36, Chapter 4.0).

11.5 SCHEDULE FOR CLOSURE

Completion of closure activities is expected to take up to two years from the date of receipt of the final volume of waste at the units. This extended time for closure is necessary due to ALARA concerns present in the facility, particularly the six interconnected hot cells. Safety systems needed to protect the environment will continue to operate during the closure process. Ecology personnel will be notified by the DOE-RL at least 45 days before the final closure activities are to begin. Closure activities are summarized in Table 11.2, and a detailed schedule of closure activities is provided in Table 11.3.

11.6 EXTENSION FOR CLOSURE TIME

An extension of the time for removal of the inventory of dangerous waste from the unit designated for closure is requested for the 325 HWTUs. The ALARA concerns that are present, particularly in the six interconnected hot cells, necessitate this extension. The expected time needed to remove all waste from the units is two years.

The extended period for removal of the inventory of dangerous waste is needed to accomplish the procedures that are needed to safely work with the ALARA concerns that are present in the SAL. All activities required to remove the inventory of dangerous waste will be conducted in accordance with applicable permit conditions and all safety systems will continue to be operated. The removal of the inventory of dangerous waste will be conducted following procedures that are designed to be protective of the workers and the environment.

An extension of the closure time is requested for the 325 HWTUs. The ALARA concerns that are present, particularly in the six interconnected hot cells, necessitate this extension. The expected time needed to close the units is two years.

Decontamination of hot cells is a slow and labor-intensive operation, complicated by the fact that most of the work must be done remotely using manipulators because of ALARA concerns that are present in the hot cells. Even after ALARA concerns have been reduced enough to allow personnel entry, work is hampered by the extensive personal protective equipment that staff are required to wear, and the strict procedures that are enforced to ensure that both workers and the environment are protected from contamination.

Most equipment located in the hot cells must be packaged in shielded containers. Typically, this requires extensive remotely operated size reduction of the equipment. Removal of hot cell equipment, such as is located in the SAL, usually takes many months to a year or more to complete.

The extended closure period is needed to accomplish the procedures that are needed to safely work with ALARA concerns that are present in the SAL. All closure activities will be conducted in accordance with applicable permit conditions and all safety systems will continue to be operated. The closure activities will be conducted following procedures that are designed to be protective of the workers and the environment.

11.7 CLOSURE COST ESTIMATE

An annual report outlining updated projections of anticipated closure costs for the Hanford Facility TSD units having final status will be submitted to Ecology in accordance with WAC 173-303-390 by October 31 of each year.

Table 11.1. Analysis Parameters for Closure of the 325 Hazardous Waste Treatment Units

Parameter and EPA SW-846[a] Analytical Method	Equipment and Structures Wipe Samples	Decontamination Waste Water Samples	Soil Samples (if determined to be contaminated)
pH for corrosivity (Method 9040 or 9045)		X	
Ignitability (Method 1010 or 1020)		X	
TCLP (Extraction Method 1311) • Metals (Method 6000 and/or 7000 series) • Volatile organics (Method 8240) • Semivolatile organics (Method 8270) • Chlorinated pesticides (Method 8080)		X	
Total metals: antimony, arsenic, beryllium, boron, cadmium, chromium, lead, mercury, nickel, selenium, silver, and thallium (Method 6000 and/or 7000 series)	X		X
Volatile organics (Method 8240)	X		X
Semivolatile organics (Method 8270)	X		X
Radioactivity [b] • Gross alpha (Method 9310) • Gross beta (Method 9310)	X	X	X

a SW-846 = EPA Test Methods for Evaluating Solid Wastes (Third Edition, latest update, 1986).
b Characterization of radionuclides is provided for general knowledge where appropriate.

Table 11.2. Summary of Closure Activities for the 325 Hazardous Waste Treatment Units

Closure Activity Description	Expected Duration (a)
Receive final volume of dangerous waste	N/A
Notify Ecology that closure activities will commence (at least 45 days before final closure activities begin)	N/A
Remove waste inventory and package, manifest, and transport all dangerous waste for treatment, storage, and/or disposal	80 days
Initial decontamination of the hot cells	120 days
Remove equipment from hot cells	270 days
Visual inspection of structural surfaces, equipment, troughs, and tanks in the HWTU and SAL to identify areas of contamination and to determine levels and methods of decontamination required	30 days
Decontaminate structural surfaces, equipment, troughs, and tanks at the HWTU and SAL using methods determined after visual inspection	180 days
Decontaminate front face and rear face	120 days
Reinspect surfaces to verify thoroughness of decontamination	2 days
Evaluate best methods for treatment and disposal of waste resulting from decontamination	25 days
Dispose of waste resulting from decontamination	80 days
Submit certification of closure to Ecology (within 60 days of completion of final closure activities)	N/A

(a) Some activities are performed concurrently.

Table 11.3. Closure Schedule for the 325 Hazardous Waste Treatment Units

Action	Schedule
Date of receipt of last volume of waste	Day 0
Waste inventory removal	Day 90
Equipment decontamination or disposal and visual inspection of structural surfaces to identify areas of contamination and to determine level of decontamination needed	Day 530
HWTU and SAL structural decontamination	Day 635
HWTU sump and fire water containment tank and SAL hot cells trough decontamination	Day 650
Visual inspection to determine effectiveness of decontamination	Day 690
Further decontamination and visual inspection, if necessary, and disposal of all decontamination waste based on results of waste analyses	Day 720
Clean closure certification	Day 780

Contents

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12.0 REPORTING AND RECORDKEEPING

Reports and records applicable to the 325 HWTUs are summarized in Attachment 33, *General Information Portion*, (DOE/RL-91-28), Chapter 12.0, Table 12.1.

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Contents

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13.0 OTHER RELEVANT LAWS

Applicable federal and state laws and local requirements are discussed in Attachment 33, *General Information Portion*, Chapter 13.0 (DOE/RL-91-28).

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ATTACHMENT 37

183-H Solar Evaporation Basins

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Contents

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FORM 3

DANGEROUS WASTE PERMIT APPLICATION

I. EPA/State I.D. No.

W	A	7	8	9	0	0	0	8	9	6	7

FOR OFFICIAL USE ONLY

Application Approved	Date Received (month/ day / year)	Comments

II. FIRST OR REVISED APPLICATION

Place an "X" in the appropriate box in A or B below (mark one box only) to indicate whether this is the first application you are submitting for your facility or a revised application. If this is your first application and you already know your facility's EPA/STATE I.D. Number, or If this is a revised application, enter your facility's EPA/STATE I.D. Number in Section I above.

A. First Application (place an "X" below and provide the appropriate date)

☐ **1. Existing Facility** (See instructions for definition of "existing" facility. Complete item below.)

MO	DAY	YEAR
03	22	1943

*For existing facilities, provide the date (mo/day/yr) operation began or the date construction commenced. (use the boxes to the left)

*The date construction of the Hanford Facility commenced

☐ **2. New Facility** (Complete item below.)

MO	DAY	YEAR

For new facilities, provide the date (mo/day/yr) operation began or is expected to begin

B. Revised Application (Place an "X" below and complete Section I above)

☒ **1. Facility has an Interim Status Permit**

☒ **2. Facility has a Final Permit**

III. PROCESSES – CODES AND DESIGN CAPACITIES

A. Process Code – Enter the code from the list of process codes below that best describes each process to be used at the facility. Ten lines are provided for entering codes. If more lines are needed, enter the codes(s) in the space provided. If a process will be used that is not included in the list of codes below, then describe the process (including its design capacity) in the space provided on the (Section III-C).

B. Process Design Capacity – For each code entered in column A enter the capacity of the process.

1. Amount – Enter the amount.
2. Unit of Measure – For each amount entered in column B(1), enter the code from the list of unit measure codes below that describes the unit of measure used. Only the units of measure that are listed below should be used.

PROCESS	PROCESS CODE	APPROPRIATE UNITS OF MEASURE FOR PROCESS DESIGN CAPACITY
STORAGE:		
Container (barrel, drum, etc.)	S01	Gallons or liters
Tank	S02	Gallons or liters
Waste pile	S03	Cubic yards or cubic meters
Surface impoundment	S04	Gallons or liters
	S06	Cubic yards or cubic meters*
DISPOSAL:		
Injection well	D80	Gallons or liters
Landfill	D81	Acre-feet (the volume that would cover one acre to a Depth of one foot) or hectare-meter
Land application	D82	Acres or hectares
Ocean disposal	D83	Gallons per day or liters per day
Surface impoundment	D84	Gallons or liters
TREATMENT:		
Tank	T01	Gallons per day or liters per day
Surface impoundment	T02	Gallons per day or liters per day
Incinerator	T03	Tons per hour or metric tons per hour; gallons per hour or liters per hour
Other (use for physical, chemical, thermal or biological treatment processes not occurring in tanks, surface impoundments or incinerators. Describe the processes in the space provided; Section III-C.)	T04	Gallons per day or liters per day

Unit of Measure	Unit of Measure Code	Unit of Measure	Unit of Measure Code	Unit of Measure	Unit of Measure Code
Gallons	G	Liters Per Day	V	Acre-Feet	A
Liters	L	Tons Per Hour	D	Hectare-Meter	F
Cubic Yards	Y	Metric Tons Per Hour	W	Acres	B
Cubic Meters	C	Gallons Per Hour	E	Hectares	Q
Gallons Per Day	U	Liters Per Hour	H		

*Add per request of Washington State Department of Ecology (01/2001)

III. PROCESS – CODES AND DESIGN CAPACITIES (continued)

Example for Completing Section III (shown in line numbers X-1 and X-2 below): A facility has two storage tanks; one tank can hold 200 gallons and the other can hold 400 gallons. The facility also has an incinerator that can burn up to 20 gallons per hour.

Line No.	A. Process Code *(from list above)*			B. Process Design Capacity 1. Amount *(Specify)*	2. Unit of Measure *(enter code)*			For Official Use Only			
X-1	S	0	2	600		G					
X-2	T	0	3	20		E					
1	S	0	2	2,167,000		G					
2	T	0	1	700		U					
3											
4											
5											
6											
7											
8											
9											
10											

C. Space for additional process codes or for describing other process (code "T04"). For each process entered here include design capacity.

S02, T01

The 183-H Solar Evaporation Basins were used for the storage and treatment of mixed waste generated in the N Reactor fuels fabrication facilities. In addition, nonradioactive dangerous waste was discharged to the basins on a nonroutine basis. These deactivated water treatment basins received a maximum of approximately 400,000 gallons (1,514,160 liters) of waste a year. The basins had a tank treatment design capacity of 700 gallons (2,650 liters) of waste a day treated by evaporation and a tank storage design capacity of 2,167,000 gallons (8,202,960 liters), a collective value representing all four basins. The basins have not received waste since November 1985. Closure activities have been completed and postclosure groundwater monitoring is being conducted.

IV. DESCRIPTION OF DANGEROUS WASTES

A. Dangerous Waste Number – Enter the digit number from Chapter 173-303 WAC for each listed dangerous waste you will handle. If you handle dangerous wastes which are not listed in Chapter 173-303 WAC, enter the four-digit number(s) that describes the characteristics and/or the toxic contaminants of those dangerous wastes.

B. Estimated Annual Quantity - For each listed waste entered in column A, estimate the quantity of that waste that will be handled on an annual basis. For each characteristic or toxic contaminant entered in column A, estimate the total annual quantity of all the non-listed waste(s) that will be handled which possess that characteristic or contaminant.

C. Unit of Measure - For each quantity entered in column B enter the unit of measure code. Units of measure which must be used and the appropriate odes are:

ENGLISH UNIT OF MEASURE	CODE	METRIC UNIT OF MEASURE	CODE
Pounds	P	Kilograms	K
Tons	T	Metric Tons	M

If facility records use any other unit of measure for quantity, the units of measure must be converted into one of the required units of measure taking into account the appropriate density or specific gravity of the waste.

D. Processes

1. Process Codes:

For listed dangerous waste: For each listed dangerous waste entered in column A select the code(s) from the list of process codes contained in Section III to indicate how the waste will be stored, treated, and/or disposed of at the facility.

For non-listed dangerous wastes: For each characteristic or toxic contaminant entered in Column A, select the code(s) from the list of process codes contained in Section III to indicate all the processes that will be used to store, treat, and/or dispose of all the non-listed dangerous wastes that possess that characteristic or toxic contaminant.

Note: Four spaces are provided for entering process codes. If more are needed: (1) Enter the first three as described above; (2) Enter "000" in the extreme right box of item IV-D(1); and (3) Enter in the space provided on page 4, the line number and the additional code(s).

2. Process Description: If a code is not listed for a process that will be used, describe the process in the space provided on the form.

NOTE: DANGEROUS WASTES DESCRIBED BY MORE THAN ONE DANGEROUS WASTE NUMBER - Dangerous wastes that can be described by more than one Waste Number shall be described on the form as follows:

1. Select one of the Dangerous Waste Numbers and enter it in column A. On the same line complete columns B, C, and D by estimating the total annual quantity of the waste and describing all the processes to be used to treat, store, and/or dispose of the waste.
2. In column A of the next line enter the other Dangerous Waste Number that can be used to describe the waste. In column D(2) on that line enter "Included with above" and make no other entries on that line.
3. Repeat step 2 for each other Dangerous Waste Number that can be used to describe the dangerous waste.

Example for completing Section IV (shown in line numbers X-1, X-2, X-3, and X-4 below) - A facility will treat and dispose of an estimated 900 pounds per year of chrome shavings from leather tanning and finishing operation. In addition, the facility will treat and dispose of three non-listed wastes. Two wastes are corrosive only and there will be an estimated 200 pounds per year of each waste.

Line No.	A. Dangerous Waste No. *(enter code)*	B. Estimated Annual Quantity of Waste	C. Unit of Measure *(enter code)*	D. Processes 1. Process Codes *(enter)*	D. Processes 2. Process Description *(if a code is not entered in D(1))*
X-1	*K 0 5 4*	*900*	*P*	*T03 D80*	
X-2	*D 0 0 2*	*400*	*P*	*T03 D80*	
X-3	*D 0 0 1*	*100*	*P*	*T03 D80*	
X-4	*D 0 0 2*			*T03 D80*	*Included with above*

Photocopy this page before completing if you have more than 26 wastes to list.

I.D. Number *(enter from page 1)*

W	A	7	8	9	0	0	0	8	9	6	7

IV. DESCRIPTION OF DANGEROUS WASTES *(continued)*

Line No.	A. Dangerous Waste No. *(enter code)*				B. Estimated Annual Quantity of Waste	C. Unit of Measure *(enter code)*			D. Processes 1. Process Codes *(enter)*				D. Processes 2. Process Description *(if a code is not entered in D(1))*
1	W	T	0	1	3,600,000		P		S02	T01			Tank Storage/Evaporation
2	D	0	0	7			P		S02	T01			Tank Storage/Evaporation
3	U	1	2	3			P		S02	T01			Tank Storage/Evaporation
4	P	0	2	9			P		S02	T01			Tank Storage/Evaporation
5	P	0	3	0			P		S02	T01			Tank Storage/Evaporation
6	P	0	9	8			P		S02	T01			Tank Storage/Evaporation
7	P	1	0	6			P		S02	T01			Tank Storage/Evaporation
8	P	1	2	0			P		S02	T01			Tank Storage/Evaporation
9													
10													
11													
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IV. DESCRIPTION OF DANGEROUS WASTE (continued)

E. Use this space to list additional process codes from Section D(1) on page 3.

The 183-H Solar Evaporation Basins received mixed waste. This waste consisted primarily of neutralized acid process waste that was designated Extremely Hazardous Waste (EHW) because of toxicity (WT01). The basins also received various nonradioactive waste (listed discarded chemical products), resulting in designation for cyanides (P030), vanadium penoxide (P120), and formic acid (U123). Approximately 3,600,000 pounds (1,632,000 kilograms) of waste a year was treated. Additionally, Basin No. 2 liquid was designated EP Toxic because of the presence of chromium (D007).

V. FACILIITY DRAWING Refer to attached drawing(s).

All existing facilities must include in the space provided on page 5 a scale drawing of the facility (see instructions for more detail).

VI. PHOTOGRAPHS Refer to attached photograph(s).

All existing facilities must include photographs (aerial or ground-level) that clearly delineate all existing structures; existing storage, treatment and disposal areas; and sites of future storage, treatment or disposal areas (see instructions for more detail).

VII. FACILITY GEOGRAPHIC LOCATION This information is provided on the attached drawings and photos.

LATITUDE *(degrees, minutes, & seconds)*	LONGITUDE *(degrees, minutes, & seconds)*

VIII. FACILITY OWNER

☒ A. If the facility owner is also the facility operator as listed in Section VII on Form 1, "General Information," place an "X" in the box to the left and skip to Section IX below.

B. If the facility owner is not the facility operator as listed in Section VII on Form 1, complete the following items:

1. Name of Facility's Legal Owner	2. Phone Number *(area code & no.)*

3. Street or P.O. Box	4. City or Town	5. St.	6. Zip Code

IX. OWNER CERTIFICATION

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this and all attached documents, and that based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the submitted information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

Name *(print or type)*	Signature	Date Signed
Keith A. Klein, Manager U.S. Department of Energy Richland Operations Office	[signature]	7/1/02

X. OPERATOR CERTIFICATION

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this and all attached documents, and that based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the submitted information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

Name *(Print Or Type)*	Signature	Date Signed
See attachment		

X. OPERATOR CERTIFICATION

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this and all attached documents, and that based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the submitted information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

Owner/Operator
Keith A. Klein, Manager
U.S. Department of Energy
Richland Operations Office

7/1/02
Date

/FOR
Co-operator
E. Keith Thomson
President and Chief Executive Officer
Fluor Hanford

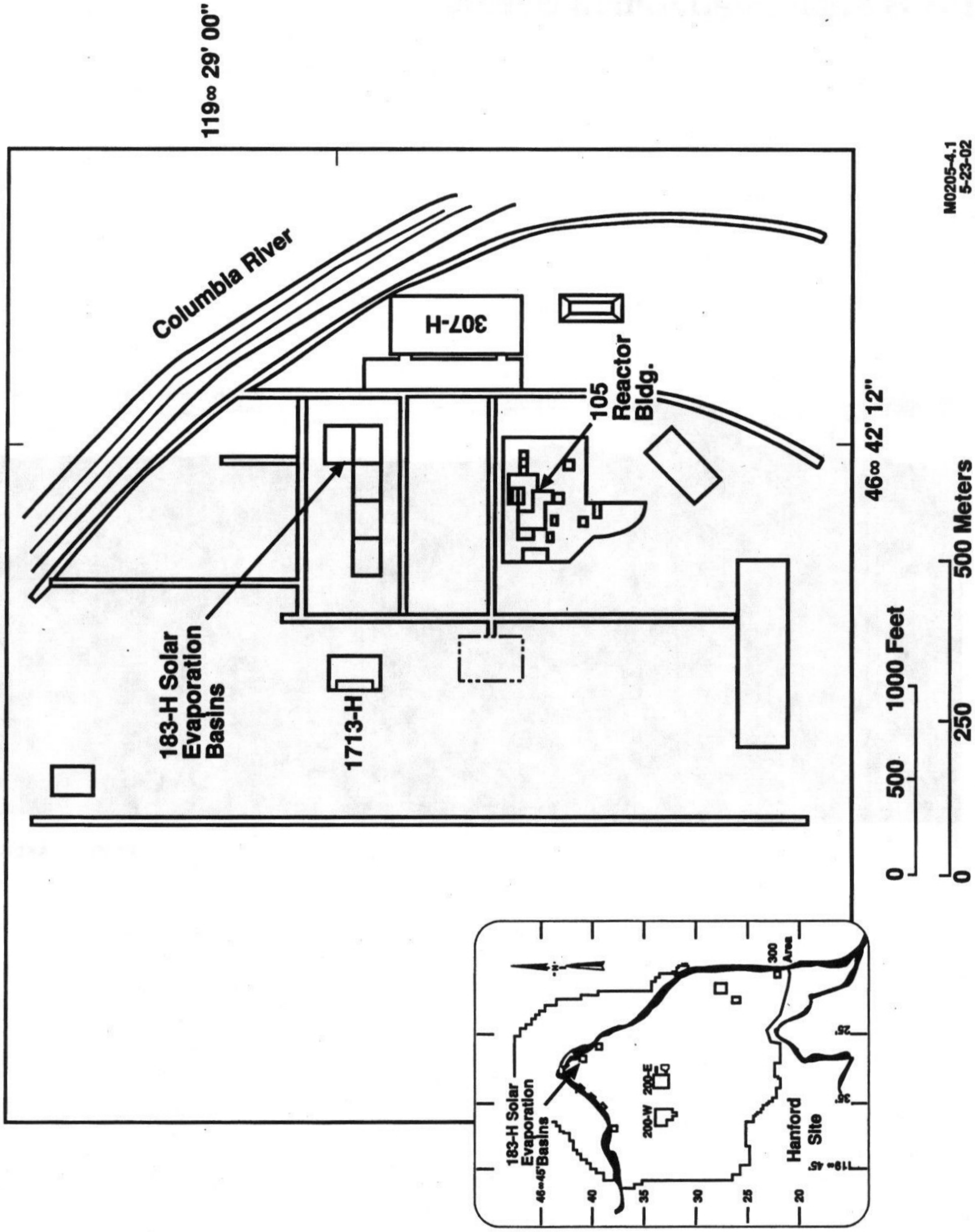
5-30-02
Date

100-H Area
183-H Solar Evaporation Basins

(PHOTO TAKEN 2002)

OFFICIAL USE ONLY

100-H Area
183-H Solar Evaporation Basins Site Plan



Contents

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2.0 MODIFIED POSTCLOSURE INSTITUTIONAL CONTROLS AND PERIODIC ASSESSMENTS

2.1 INSTITUTIONAL CONTROLS

No direct exposure contamination remains at 183-H. The extent of contamination remaining at the time of closure of this unit extended from deep vadose zone soils (4.6 m[15 ft] below the bottom of the basin structure) to and including saturated soils and groundwater. Therefore, no measures are required to limit or prohibit activities at the surface. For example, fences or barriers are not required for maintaining access restrictions.

Institutional controls are required to be maintained in order to ensure that groundwater is not used as a drinking water or irrigation source. Because RL will maintain control over this site for the foreseeable future and potentially until the groundwater is remediated, it is not anticipated that additional actions will be required to limit controls over groundwater usage. Should groundwater use restrictions be required after RL relinquishment of the area, appropriate deed restrictions will be made.

2.2 PERIODIC ASSESSMENTS

Periodic assessments are required by Permit Condition II.K.3.b. The first periodic assessment will take place after a period of five years from the completion of closure (July 28, 2001). As allowed by WAC 173-340-410, a compliance monitoring plan for protection and confirmation monitoring during the five-year period may be combined with other plans. Protection and confirmation sampling of groundwater will be achieved through implementation of the dangerous waste final status groundwater monitoring plan. No soil remediation is anticipated to occur during the five-year period. Should subsequent assessment periods be required which include soil remediation activities, a compliance monitoring plan will be combined with the CERCLA Operation and Maintenance Plan for the 100-HR-1 Operable Unit.

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Contents

Figures

Tables

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3.0 GROUNDWATER MONITORING DURING POSTCLOSURE

Groundwater concentration limits have been exceeded for dangerous waste constituents in downgradient monitoring wells at 183-H. WAC 173-303-645(11) requires that a corrective action program be established in the Permit to (1) address the contamination, and (2) monitor the effectiveness of the action (Rasmussen 1996c). This postclosure plan, along with a revised groundwater monitoring plan (Hartman 1997), describes current and future actions to satisfy this requirement.

Corrective action to address groundwater contamination in the 100-H Area, including contamination that has resulted from 183-H, has been initiated as part of CERCLA remediation activities. An IRM to remove hexavalent chromium will begin extracting groundwater from wells located in the vicinity of the former 183-H in July 1997 (DOE-RL 1996b). The IRM pumping system will change local hydraulic gradients and the direction of groundwater flow.

Not all of the dangerous waste constituents attributable to 183-H are specifically targeted by the IRM treatment system. The primary treatment target is chromium. However, nitrate and two nondangerous waste constituents, technetium-99 and uranium, are also likely to be retained on the ion exchange columns, although hexavalent chromium will be preferentially retained. The IRM corrective action is the first phase of groundwater remediation in the 100-H Area, with subsequent phases to be determined by the feasibility study process under CERCLA. A final ROD will be established using information gained during the IRM for chromium.

Figure 3.1 shows the locations of existing groundwater monitoring wells in the 100-H Area. Figure 3.2 illustrates the changes to groundwater flow that are expected to occur during IRM pumping operations. In general, flow direction will change from an easterly to a more northerly direction beneath the former 183-H basins. Changes in water quality, as observed in monitoring wells influenced by the pumping operation, are also expected to occur. Figure 3.3 provides a recent interpretation showing the distribution of chromium contamination in the 100-H Area.

Because of the corrective action pumping operations, the list of "point of compliance" wells per WAC 173-303-645 requirements will change from the definition presented in the 183-H compliance monitoring plan (Hartman and Chou 1995). Also, the change in flow direction may result in variable concentrations for the dangerous waste indicators in the wells previously identified as points of compliance. Therefore, a revised groundwater monitoring plan has been prepared (Hartman 1997) that reflects corrective action monitoring requirements.

The following sections outline the requirements for groundwater monitoring during corrective action and present a sampling and analysis schedule for meeting the requirements. The sampling and analysis schedule for RCRA corrective action requirements becomes a condition of the revised Permit. Other sampling and analysis activities within the 100-H Area are also described for general information purposes only.

3.1 WAC 173-303-645(11)(D) MONITORING REQUIREMENTS

The WAC 173-303-645(11) Corrective Action Program requires the establishment and implementation of a groundwater monitoring program that is capable of demonstrating the effectiveness of the corrective action. This requirement states two general objectives:

- The program may be based on the requirements for a compliance monitoring program under WAC 173-303-645(10) and must be as effective as that program in determining compliance with the groundwater protection standard under WAC 173-303-645(3). A compliance monitoring program that met the objectives of the groundwater protection standard was established and adopted within the Permit (Hartman and Chou 1995).
- Monitoring during corrective actions must be capable of determining the success of the corrective action program. A revised groundwater monitoring plan has been prepared to reflect corrective action requirements (Hartman 1997). Also, as part of the IRM to address chromium contamination, a performance monitoring program has been designed and implemented to evaluate the effectiveness of the pump-and-treat system (DOE-RL 1997).

The following sections demonstrate how the corrective action monitoring requirements in WAC 173-303-645(11) will be met in the 183-H Corrective Action Groundwater Monitoring Plan and 183-H Postclosure Plan.

3.1.1 WAC 173-303-645(3) Groundwater Protection Standard

Washington Administrative Code 173-303-645(3) introduces the principal requirements that must be met to comply with the Dangerous Waste Regulations for releases from regulated units. It refers to WAC 173-303-645(4) Dangerous Constituents, WAC 173-303-645(5) Concentration Limits, WAC 173-303-645(6) Point of Compliance, and WAC 173-303-645(7) Compliance Period. The Groundwater Protection Standard for the regulated unit has been established by Ecology in the facility Permit.

3.1.1.1 WAC 173-303-645(4) Dangerous Constituents

Dangerous waste constituents were identified in the 183-H compliance monitoring plan (Hartman and Chou 1995). They are hexavalent chromium, as represented by an analysis for total chromium using filtered samples, and nitrate.

Additional waste indicators used to define the contaminant plume attributable to 183-H are technetium-99 and uranium. Wastes from 183-H basins' leakage may have altered various other water quality parameters that are not regulated, but are useful for identifying and tracking contamination from 183-H basins (e.g., specific conductance). Because fluoride was discovered to be elevated in the soil at the bottom of the excavation beneath the 183-H footprint (along with nitrate), fluoride will also be used as an indicator for 183-H contamination in groundwater.

All of the above constituents of interest will be monitored under the revised plan for corrective action groundwater monitoring (Hartman 1997).

3.1.1.2 WAC 173-303-645(5) Concentration Limits

Dangerous waste constituents from the regulated waste unit may not exceed concentration limits established by the Permit. Permit limits were defined previously in the 183-H compliance monitoring plan (Hartman and Chou 1995). Concentration limits established for the 183-H groundwater plume were as follows:

Dangerous Waste Constituents:	
Chromium (total; filtered sample)	122 µg/L--local background; upgradient sources
Nitrate	45,000 µg/L--EPA MCL for drinking water
Other 183-H Waste Indicators:	
Technetium-99	900 pCi/L--EPA MCL for drinking water
Uranium (total; chemical analysis)	20 µg/L--EPA MCL--proposed

During the period of time that the IRM to address chromium is extracting groundwater, the corrective action monitoring described in the revised groundwater monitoring plan (Hartman 1997) will continue to evaluate new analytical results relative to these concentration limits. Additionally, fluoride results will be evaluated relative to previously established trends and to the EPA MCL for drinking water, which is 1,400 μg/L.

3.1.1.3 WAC 173-303-645(6) Point of Compliance

"The point of compliance is a vertical surface located at the hydraulically downgradient limit of the waste management area that extends down into the uppermost aquifer underlying the regulated unit." Operation of the IRM groundwater extraction network will alter the pattern of groundwater flow. Therefore, the relative positions (i.e,. upgradient, downgradient) for some of the monitoring wells used to establish the point of compliance listed in the 183-H compliance monitoring plan (Hartman and Chou 1995) will change (see Section 3.2).

A new list of wells has been defined to act as points of compliance while the IRM is operating. The new list was developed at a workshop held on March 5, 1997 using the EPA Data Quality Objectives process. The points of compliance identified at the workshop were subsequently approved by Ecology on April 22, 1997 via letter (Soper 1997b). The wells are identified in the revised groundwater monitoring plan for corrective action monitoring (Hartman 1997) and also in Section 3.2.

3.1.1.4 WAC 173-303-645(7) Compliance Period

The modified RCRA network and sampling schedule will be in effect during groundwater extraction operations that are conducted as part of the IRM for chromium. Based on the observed impact that the IRM has on groundwater flow patterns and water quality after operations begin, further modifications to the RCRA network may be appropriate during and following the IRM. This postclosure plan and the revised groundwater monitoring plan for corrective action monitoring will be revised and incorporated into a permit modification, as necessary.

Following cessation of groundwater extraction operations under the IRM, RCRA monitoring under the final status monitoring plan (Hartman, 1997) will continue for a minimum of three consecutive years (WAC 173-303-645(7)(c) to demonstrate that the groundwater protection standards of WAC 173-303-645(3) have been met. This monitoring will complement monitoring conducted to (1) evaluate the performance of the IRM and (2) support selection of a final remediation alternative.

3.1.2 WAC 173-303-645(8) General Groundwater Monitoring Requirements

The requirements described in WAC 173-303-645(8) will be met as described in the 183-H corrective action monitoring plan (Hartman, 1997). Newly collected data will be reported quarterly and an evaluation of monitoring data will be reported in the Annual Groundwater Project Report for the Hanford Site (e.g., Hartman and Dresel 1997).

3.2 RCRA CORRECTIVE ACTION GROUNDWATER MONITORING SCHEDULE

The 183-H compliance monitoring plan (Hartman and Chou 1995) has been revised (Hartman 1997) to accommodate changes in (1) the groundwater flow pattern and (2) concentrations of selected waste indicators, which are brought on by pump-and-treat remediation activities. The EPA Data Quality Objectives process (EPA 1994) was followed to help design the revised sampling and analysis schedule. Representatives from RL, Ecology, and EPA reached consensus on objectives, wells to be sampled, constituents for analysis, sampling frequency, and water level measurements (Furman 1997).

The resulting schedule for the 183-H RCRA network is presented in Table 3.1. This table identifies the wells being sampled, the frequency of sampling, and an analysis suite code for the previous RCRA compliance monitoring schedule and for the revised corrective action monitoring schedule. Table 3.2 provides a complete description of the constituent analysis suites. Information on sampling schedules under CERCLA are included in the Tables, to provide a complete description of all groundwater monitoring activities being conducted in the vicinity of the former 183-H facility.

The RCRA sampling and analysis schedule includes a network of four wells sampled annually. The wells are 199-H4-3, 199-H4-7, 199-H4-12A, and 199-H4-12C (see Figure 3.1). (Wells 199-H4-7 and 199-H4-12A are also used as extraction wells for the pump-and-treat system.) Water samples will be analyzed for the constituents of concern previously identified for tracking contamination attributable to the 183-H basins (nitrate, fluoride, chromium, uranium, and technetium-99). Additional analyses will be performed for alkalinity, other anions, and other metals, to aid in interpreting results. Field parameters (pH, temperature, specific conductance, and turbidity) will also be measured.

Minor modifications to the list of specific wells used and constituents analyzed may be appropriate to account for changing field conditions, IRM operational requirements, and changes identified during the data evaluation process. Recommendations for minor modifications will be presented for regulator approval outside of the permit modification process prior to implementation.

3.3 GROUNDWATER MONITORING UNDER CERCLA

Groundwater underlying the former 183-H basins is included in the 100-HR-3 Operable Unit. This groundwater operable unit contains the groundwater underlying the 100-D/DO Area, 100-H Area, and the 600 Area in between. Along the Columbia River, the boundary of the operable unit is generally accepted as the interface between groundwater discharging from the aquifer and river water. Samples of riverbank seepage and of pore water from riverbed sediment are used to monitor the interface.

3.3.1 100-HR-3 Remedial Investigation Monitoring

The remedial investigation was initially guided by a work plan (DOE-RL 1992) that directed a limited field investigation. A limited field investigation report, which includes a qualitative risk assessment, was prepared (DOE-RL 1994). A focused feasibility study was subsequently conducted that looked at various remediation alternatives to address chromium contamination, and also to help decide whether interim remedial measures were warranted (DOE-RL 1995a). A proposed plan (DOE-RL 1995b) and Record-of-Decision (EPA 1996) were then prepared that described a pump-and-treat alternative to address chromium in the 100-HR-3 and 100-KR-4 Operable Units.

In addition to chromium, other groundwater constituents in the 100-H Area remain above EPA drinking water standards and/or Washington State cleanup levels (Peterson et al. 1996). Chemical constituents include aluminum, fluoride, iron, manganese, nitrate, and uranium. Radiological constituents include gross alpha, gross beta, strontium-90, and technetium-99. None of these constituents have been designated as contaminants of concern for interim remedial measures, by reason of human health or ecological risk.

Sampling under the remedial investigation is typically conducted annually, with some wells being monitored quarterly for selected constituents, and others being sampled once every two years. Biennial sampling is conducted where two wells monitor essentially the same conditions, but each well is sampled on alternate years. The schedule for remedial investigation monitoring well sampling for FY 1997 and FY 1998 is included in Table 3.1.

3.3.2 100-HR-3 Interim Remedial Measure Monitoring

A decision was made in 1996 to proceed with accelerated remediation activities to remove hexavalent chromium (Cr^{+6}) from groundwater underlying the 100-HR-3 Operable Unit (DOE-RL 1995b; EPA

1996). The activities involve pumping groundwater from wells located near the river and removing chromium using an ion exchange resin (DOE-RL 1996a). In the 100-H Area, two additional inland wells were added to the extraction network to intercept chromium migrating into the 100-H Area from sources located to the west. The treated effluent will be reinjected into the unconfined aquifer at an upgradient inland location. Operation of the pump-and-treat system is scheduled to start in July 1997. As stated in the ROD (EPA 1996), the remedial action objectives for the pump-and-treat system include the following three components:

- Protect aquatic receptors in the river bottom substrate from contaminants in groundwater entering the Columbia River (Note: The ROD identifies Cr+6 as the target contaminant)
- Protect human health by preventing exposure to contaminants in the groundwater
- Provide information that will lead to the final remedy.

The relevant standard for meeting these objectives during the IRM is the State of Washington's Ambient Water Quality Standard (AWQS) for Protection of Freshwater Aquatic Life for hexavalent chromium, which is 11 μg/L for chronic exposure (WAC 173-201A-040). The highest priority contaminated areas to be addressed initially by the remedial action are adjacent to riverbed substrate that is known to provide suitable habitat for salmon spawning. Some of these areas have been defined by direct observation of riverbed substrate and sediment pore water analysis (Hope and Peterson 1996a and 1996b).

In addition to chromium, other contaminants of concern in the 100-H Area that were identified in the ROD (EPA 1996) are nitrate, strontium-90, technetium-99, and uranium. With the exception of strontium-90, the ion exchange treatment system is expected to reduce concentrations of all these contaminants. Tritium may also be present in the extracted water; however, tritium concentrations in 100-H Area wells have decreased to below drinking water standards (Peterson et al. 1996).

3.3.2.1 Data Quality Objectives for IRM Monitoring.

Groundwater sampling and analysis activities associated with the IRM for chromium (DOE-RL 1997) serve two general purposes: (1) Performance monitoring to determine the effectiveness and efficiency of the extraction system, and (2) compliance monitoring to show how well the remediation is doing relative to target goals described in the ROD (EPA, 1996).

The objectives for performance monitoring are to collect water level and water quality data that are used to (1) optimize the performance of the groundwater extraction system, (2) document aquifer and chromium plume response to pumping and injection of treated effluent, and (3) obtain supplemental data to support selection of a final remediation alternative for the 100-HR-3 Operable Unit.

Objectives for compliance monitoring are described in the interim ROD (EPA, 1996), which states that monitoring will be conducted at near-river onshore locations that are above the river's high water line. Sampling will be conducted at multiple depth intervals at compliance locations. A dilution factor of 1:1 is allowed when demonstrating compliance with the WAC AWQS of 11 μg/L in riverbed sediment. That is, 22 μg/L at compliance locations is deemed equivalent to 11 μg/L at depths in riverbed substrate of up to 46 cm. Locations initially designated to serve as compliance monitoring points are wells 199-H4-4, 199-H4-5, 199-H4-49, 199-H4-63, and 199-H4-64.

3.3.2.2 IRM Monitoring Wells and Sampling Schedules.

The groundwater monitoring wells used to support the interim remedial measure include extraction wells, injection wells, performance monitoring wells, and compliance monitoring wells. The wells are used to obtain water quality data and water level measurements. The schedules for sampling and analysis of these wells are described in Table 3.1 with the analysis listed in Table 3.2. The tables summarize the sampling and analysis schedules for the IRM network as it is planned for FY 1997 and FY 1998. These schedules are subject to change as the result of information gained during the IRM. The schedule for water level measurements is provided in Table 3.3.

3.4 INSPECTION, MAINTENANCE, AND REPLACEMENT OF WELLS

Each time a well is sampled by any of the Hanford Site groundwater monitoring programs, the well head, cap, protective posts, and concrete pad are inspected. If the samplers experience problems with dedicated sampling pumps, excessive turbidity in the sample, etc., these problems are noted and maintenance is scheduled.

Periodic maintenance and rehabilitation are generally performed on Hanford Site monitoring wells at five-year intervals. This includes removing dedicated equipment, brushing the well bore, removing sediment accumulation, conducting a downhole video camera survey, responding to service difficulty reports, and reinstalling dedicated equipment. A comprehensive description of well maintenance, reconfiguration, and decommissioning is presented in Chapter 8 of the Hanford Site Annual Groundwater Monitoring Report for FY 1996 (Hartman and Dresel 1997).

Figure 3.1. Location Map for 100-H Area Monitoring Wells.

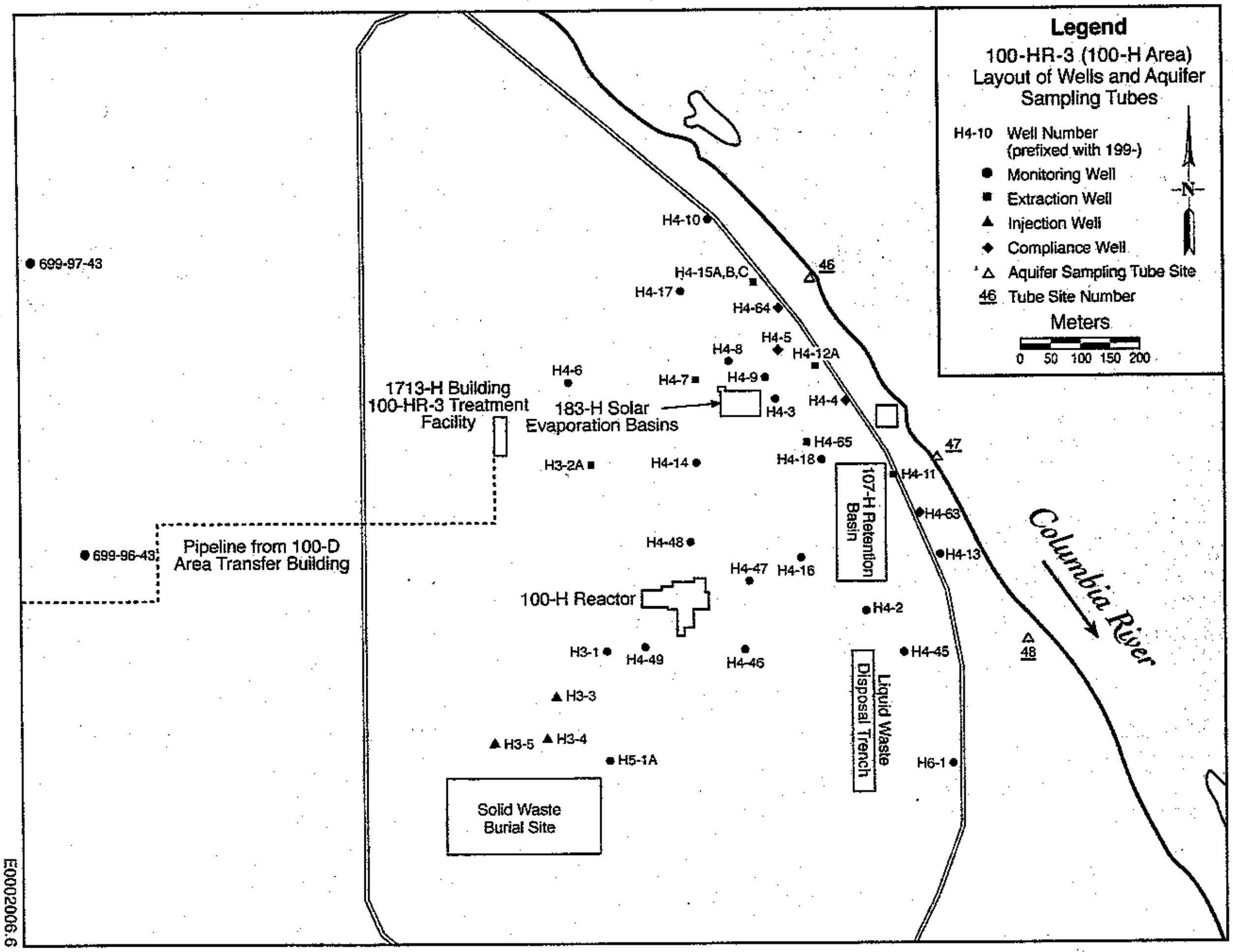


Figure 3.2. Predicted Groundwater Flow During Interim Remedial Measure.

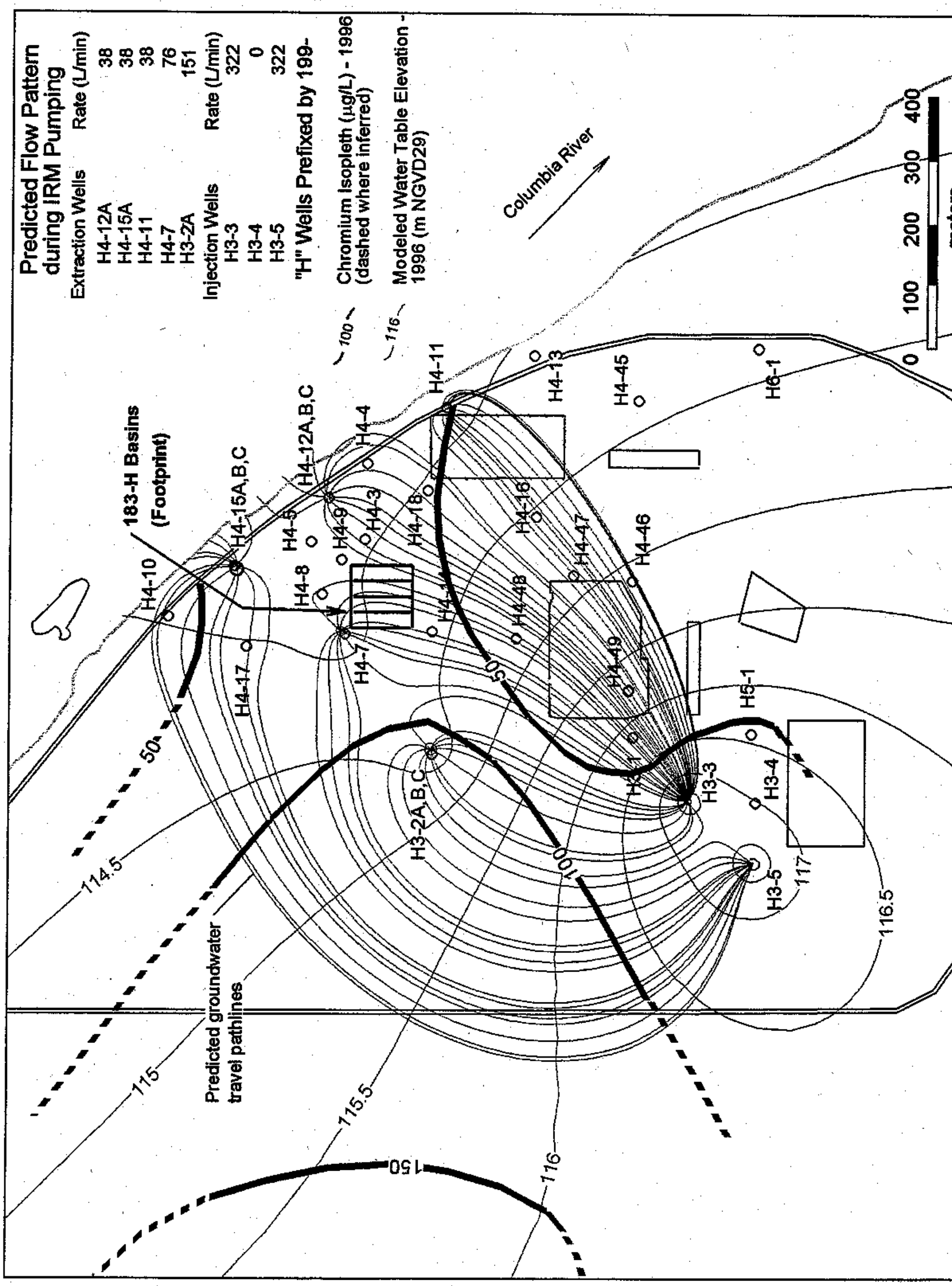
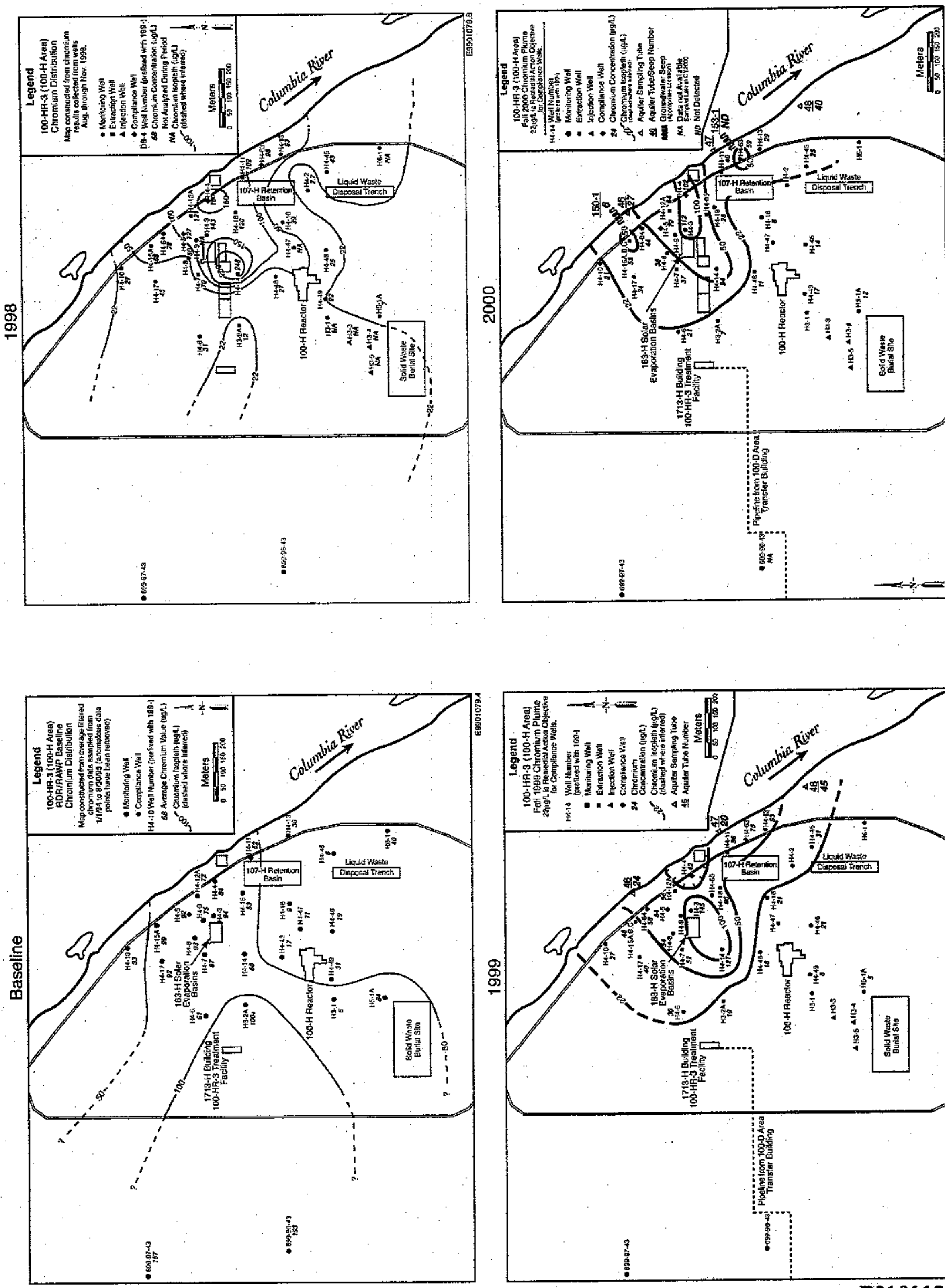


Figure 3.3. Chromium Contamination in the 100-H Area.

Figure KNT-H1 100-H Area Historic Chromium Disribution



E0101121

Table 3.1 . Sampling and Analysis Schedule for 183-H RCRA Corrective Action and CERCLA Remedial Investigation Monitoring.

Well/Location Identifier	Facility Monitored/ Purpose	RCRA:		CERCLA Remediation Activities:		
		183-H: Compliance (Pre-IRM[1])	183-H: Corrective Action [2]	RI/FS[3] Round 11: FY 97	Outlook[3] Round 12: FY 98	IRM Monitor Plan[4]
199-H3-1	Reactor building				BA(98)-2	
199-H3-2A	D-plume migration/ IRM extraction well	SA-1		A-2	A-2	SA-3 Q-Cr
199-H3-2C (deep conditions)	D-plume migration/ vertical distribution				BA(98)-2	
199-H4-3	183-H basins/IRM performance	SA-1	A-1	BA(97)-2		SA-Cr
199-H4-4	183-H basins/IRM compliance	SA-1		A-2	A-2	M-Cr
199-H4-5	183-H basins/IRM compliance				BA(98)-2	M-Cr
199-H4-6	D-plume migration/ IRM performance	SA-1		BA(97)-2		SA-Cr
199-H4-7	183-H basins/IRM extraction		A-1			SA-3 Q-Cr
199-H4-8	183-H basins/IRM performance			BA(97)-2		SA-Cr
199-H4-9	183-H basins	SA-1			BA(98)-2	
199-H4-10	D-plume migration/ IRM performance			A-2	A-2	SA-Cr
199-H4-11	Retention basins/ IRM extraction					SA-3 Q-Cr
199-H4-12A	183-H basins/ IRM extraction	SA-1	A-1			SA-3 Q-Cr
199-H4-12B	183-H basins/ IRM performance					SA-Cr
199-H4-12C (deep conditions)	183-H basins/ IRM performance	SA-1	A-1	A-2	A-2	SA-Cr
199-H4-13	Retention basins/ IRM performance			A-2	A-2	SA-Cr
199-H4-14	190-H coolant prep/ IRM performance			BA(97)-2		SA-Cr
199-H4-15A	D-plume migration/ IRM extraction					SA-3 Q-Cr
199-H4-15B	D-plume migration/ IRM performance					SA-Cr
199-H4-15CS (deep conditions)	D-plume migration/ IRM performance					SA-Cr

		RCRA:		CERCLA Remediation Activities:		
Well/Location Identifier	**Facility Monitored/ Purpose**	**183-H: Compliance (Pre-IRM[1])**	**183-H: Corrective Action [2]**	**RI/FS[3] Round 11: FY 97**	**Outlook[3] Round 12: FY 98**	**IRM Monitor Plan[4]**
199-H4-16	Reactor building/ IRM performance			BA(97)-2		SA-Cr
199-H4-17	D-plume migration/ IRM performance			BA(97)-2		SA-Cr
199-H4-18	183-H basins/ IRM performance	SA-1		A-2	A-2	SA-Cr
199-H4-45	Liquid waste disposal trench/ IRM performance			A-2	A-2	SA-Cr
199-H4-46	Reactor building/ IRM performance			BA(97)-2		SA-Cr
199-H4-47	Reactor building				BA(98)-2	
199-H4-48	Reactor building/ IRM performance				BA(98)-2	SA-Cr
199-H4-49	Reactor building/ IRM compliance				BA(98)-2	SA-Cr
199-H5-1A	118-H-1 solid waste burial/IRM performance				BA(98)-2	SA-Cr
199-H6-1	Liquid waste disposal trench			A-2	A-2	
199-H4-63 (new well FY97)	IRM compliance					M-Cr
199-H4-64 (new well FY97)	IRM compliance					M-Cr
699-96-43	D-plume migration/ background			BA(97)-2		
699-97-43	D-plume migration/ background				BA(98)-2	

Sampling code abbreviations: "BA" = biennial (next year), "A" = annual, "SA" = semiannual, "Q" = quarterly, and "M" = monthly. The "-1, -2, -3" suffixes define the analysis suite (Table 3.2). "Q-Cr" indicates quarterly screening for chromium, Sr-90, etc. "(+Tc-99)" indicates constituent added to basic suite listed in Table 3.2.

Footnotes (References):

1. "183-H Compliance" (183-H compliance groundwater monitoring plan - Hartman and Chou, 1995)
2. "183-H Corrective Action" (183-H corrective action groundwater monitoring plan - Hartman, 1997)
3. "RI/FS Round #11 and #12 Outlook" reflect Tri-Party Agreement Change Control Form #107, November 1996
4. "IRM Monitoring Plan" is for post-July 1997 (IRM Monitoring Plan [DOE-RL 1997]).

1

Table 3.2 . Analysis Suite Codes for 183-H RCRA Corrective Action and CERCLA Remedial Investigation Monitoring

Analysis/ Parameter	Constituent Code #1 (RCRA: FY97/98)[1]	Constituent Code #2 (RI Round 11&12-- FY97/98)[2]	Constituent Code #3 (IRM--FY97/98)[3]
Metals by routine ICP (EPA 6010A-Target Analyte List Note: Filtered and unfiltered samples for all metal analyses, except ROM collects filtered samples only	Aluminum Iron Antimony Magnesium Barium Manganese Beryllium Nickel Cadmium Potassium Calcium Silver **Chromium** Sodium Cobalt Vanadium Copper Zinc	Aluminum Iron Antimony Magnesium Barium Manganese Beryllium Nickel Cadmium Potassium Calcium Silver Chromium Sodium Cobalt Vanadium Copper Zinc	
Metals: Other (EPA 7470; Hach etc.)	Uranium		Chromium, hexavalent Uranium
Anions by IC (EPA 300.0)	Chloride Fluoride Nitrate Sulfate	Chloride Fluoride Nitrate Sulfate	Nitrate
Radionuclide screening:	Activity scan[4]	Gross alpha Gross beta Activity scan[4]	
Specific radionuclides:	Technetium-99	Tritium	Strontium-89/90 Technetium-99 Tritium
Miscellaneous parameters:	Alkalinity		
Field parameters:	pH Specific conductance Temperature Turbidity	pH Specific conductance Temperature Turbidity	pH Specific conductance Temperature Turbidity

Footnotes (References):
1. Code #1 is based on 183-H compliance groundwater monitoring plan (Hartman and Chou, 1995); constituents in **bold** are dangerous waste constituents used for evaluations under WAC-173-303-645(10).
2. Code #2 is based on Tri-Party Agreement Change Control Form #107, November 1996
3. Code #3 is from IRM Monitoring Plan (DOE-RL 1997)
4. Selected wells only

Abbreviations: ICP = inductively coupled plasma; IC = ion chromatography

1 **Table 3.3 . CERCLA Interim Remedial Measure Groundwater Well Network:**

Well Number	Intended Use	Operations Period-- July 1997 to end of IRM:			
		Hourly Water Levels[1]	Steel Tape Measure[2]	Hexavalent Chromium[3]	Co-contaminants[4]
199-H3-2A	Extraction well	Transducer	Monthly	Quarterly	Semiannual
199-H4-7	Extraction well	Transducer	Monthly	Quarterly	Semiannual
199-H4-11	Extraction well	Transducer	Monthly	Quarterly	Semiannual
199-H4-12A	Extraction well	Transducer	Monthly	Quarterly	Semiannual
199-H4-15A	Extraction well	Transducer	Monthly	Quarterly	Semiannual
199-H3-3	Injection well	Transducer	Monthly		
199-H3-4	Injection well	Transducer	Monthly		
199-H3-5	Injection well	Transducer	Monthly		
199-H4-3	Performance monitoring		Quarterly	Semiannual	
199-H4-6	Performance monitoring		Quarterly	Semiannual	
199-H4-8	Performance monitoring	Transducer	Monthly	Semiannual	
199-H4-10	Performance monitoring	Transducer	Monthly	Semiannual	
199-H4-12B	Performance monitoring	Transducer	Monthly	Semiannual	
199-H4-12C	Performance monitoring		Quarterly	Semiannual	
199-H4-13	Performance monitoring		Quarterly	Semiannual	
199-H4-14	Performance monitoring		Quarterly	Semiannual	
199-H4-15B	Performance monitoring	Transducer	Monthly	Semiannual	
199-H4-15CS	Performance monitoring		Quarterly	Semiannual	
199-H4-16	Performance monitoring		Quarterly	Semiannual	
199-H4-17	Performance monitoring		Quarterly	Semiannual	
199-H4-18	Performance monitoring		Quarterly	Semiannual	
199-H4-45	Performance monitoring		Quarterly	Semiannual	
199-H4-46	Performance monitoring		Quarterly	Semiannual	
199-H4-48	Performance monitoring		Quarterly	Semiannual	
199-H4-49	Performance monitoring		Quarterly	Semiannual	
199-H5-1A	Performance monitoring		Quarterly	Semiannual	
199-H4-4	Compliance monitoring	Transducer	Monthly	Monthly	Annual
199-H4-5	Compliance monitoring	Transducer	Monthly	Monthly	Annual
199-H4-63	Compliance monitoring	Transducer	Monthly	Monthly	Annual
199-H4-64	Compliance monitoring	Transducer	Monthly	Monthly	Annual

Footnotes:
[1] Hourly measurements using pressure transducers and data loggers
[2] Routine steel tape measurements; monthly measurements to calibrate pressure transducers
[3] Hexavalent chromium using Hach methodology, ERC Mobile Laboratory
[4] Co-contaminants: Nitrate, strontium-90, technetium-99, tritium, and uranium
[3 & 4] Field measurements for pH, specific conductance, temperature, and turbidity during all sampling
Source: DOE-RL 1997

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Groundwater Monitoring Plan for the 183-H Solar Evaporation Basins, PNNL-11573

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PNNL-11573
UC-502

Pacific Northwest
National Laboratory

Operated by Battelle for the
U.S. Department of Energy

Groundwater Monitoring Plan for the 183-H Solar Evaporation Basins

M. J. Hartman

May 1997

Prepared for the U.S. Department of Energy
under Contract DE-AC06-76RLO 1830

PNNL-11573

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Printed in the United States of America

Available to DOE and DOE contractors from the Office of Scientific and Technical Information, P.O. Box 62, Oak Ridge, TN 37831; prices available from (615) 576-8401.

Available to the public from the National Technical Information Service, U.S. Department of Commerce, 5285 Port Royal Rd., Springfield, VA 22161

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Richland, Washington 99352

Summary

Groundwater monitoring at the 183-H Solar Evaporation Basins is regulated under Washington Administrative Code 173-303-645. Proposed in this plan is the first phase of a final-status, corrective action monitoring program for the site. The monitoring network consists of four existing wells: 199-H4-3, 199-H4-7, 199-H4-12A, and 199-H4-12C. Well 199-H4-12C is completed at the base of the unconfined aquifer; the other wells are screened at the water table. Wells 199-H4-7 and 199-H4-12A are groundwater extraction wells used in a pump-and-treat system.

Groundwater samples will be collected from each well annually. Samples will be analyzed for the following:

- constituents of concern (i.e., chromium, nitrate, technetium-99, and uranium) and fluoride
- additional constituents to aid data interpretation (e.g., alkalinity, anions, and metals)
- field parameters routinely acquired at the wellhead (e.g., pH, specific conductance, temperature, and turbidity).

The objective of monitoring during operation of the pump-and-treat system is to determine whether concentrations of the contaminants of concern are decreasing.

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1.0 Introduction

This plan describes the first phase of a final-status, corrective action groundwater monitoring program for the 183-H Solar Evaporation Basins, a *Resource Conservation and Recovery Act of 1976* (RCRA) regulated unit. The 183-H basins are included in the Hanford Site RCRA Permit (Ecology 1994) and are subject to final-status requirements for groundwater monitoring.

This plan proposes the monitoring network, list of constituents to be analyzed for, and protocols for sampling and analysis that will be employed for the 183-H basins during the operation of a pump-and-treat system for chromium-contaminated groundwater. Additional phases of groundwater monitoring will be developed as the final corrective action strategy progresses.

1.1 History of Groundwater Monitoring at the 183-H Basins

Limited groundwater monitoring was conducted during the operational life of the 183-H basins (1973 to 1985). Four wells were installed, one in 1974 and three in 1983. These wells were sampled for a limited suite of analytes. In 1986 and 1987, 18 monitoring wells were installed in response to a *Consent Agreement and Compliance Order* (Ecology and EPA 1986). A RCRA monitoring program was initiated, as described in the revised groundwater monitoring compliance plan (PNL 1986). The compliance order mandated interim-status groundwater quality assessment monitoring according to Title 40, Code of Federal Regulations (CFR) Part 265 and Washington Administrative Code (WAC) 173-303-400.

The monitoring program was modified as data were collected and analyzed. An updated program was described in the closure/postclosure plan (DOE 1991). Like the original program, DOE (1991) addressed the requirements then in effect (i.e., interim status). Interpretive reports are submitted annually to the State of Washington Department of Ecology (Ecology) along with data from other RCRA units on the Hanford Site (e.g., DOE 1996a; Hartman and Dresel 1997).

In 1994, Ecology issued a RCRA permit for the Hanford Site (Ecology 1994). The 183-H basins were included in Part V of that permit, which contains requirements specifically applicable to those treatment, storage, and disposal units that are undergoing closure. Part II, Condition II.F, of the permit specifies that a groundwater monitoring program under final status will be subject to the requirements of WAC 173-303-645.

Although the RCRA permit specified final-status requirements for groundwater monitoring, it also stated that monitoring should continue under the current (interim-status) program as described in the closure/postclosure plan (an apparent contradiction in the permit). A final-status monitoring program was proposed in 1995 (Hartman and Chou 1995) to comply with the groundwater monitoring requirements specified in Part II, Condition II.F., of the permit.

The first sample set collected under the final-status compliance monitoring plan showed that downgradient concentrations of the contaminants of concern exceeded concentration limits defined in the monitoring plan. The regulations require corrective action activities to reduce contaminant concentrations in groundwater. Remediation of the groundwater was deferred to the *Comprehensive Environmental Response, Compensation, and Liability Act of 1980* (CERCLA) program, and RCRA monitoring continued under the compliance program defined in Hartman and Chou (1995).

The 183-H basins are located in the 100-HR-1 Source Operable Unit and the 100-HR-3 Groundwater Operable Unit, which are under the authority of RCRA past practice and CERCLA. An interim remedial measure (IRM) to pump and treat groundwater in the 100-H Area for chromium was initiated in 1996 (DOE 1996b). Extraction wells are located west, north, and east of the basins, and pumping is scheduled to begin in the summer of 1997. The objective of the IRM is to reduce the amount of chromium entering the Columbia River, where it is a potential hazard to the ecosystem. Programs were initiated to monitor the effectiveness of the IRM and to continue to monitor the entire 100-HR-3 Groundwater Operable Unit (DOE 1996c; Peterson and Raidl 1996). A series of workshops was held in early 1997 to develop a monitoring program capable of meeting the various objectives and requirements of CERCLA IRM, CERCLA operable unit, and RCRA monitoring. This plan presents the outcome for the RCRA requirements.

Methods for final remediation of 100-H Area groundwater are yet to be determined by the U.S. Department of Energy (DOE), the regulators, and members of the public.

1.2 Purpose of RCRA Monitoring

The monitoring program described in this plan is effective only during the operation of the CERCLA IRM in the 100-H Area. During the period of the IRM, RCRA monitoring will be conducted to track trends in four contaminants of concern (i.e., chromium, nitrate, technetium-99, and uranium) and fluoride. Although the IRM was designed to remove chromium only, the treatment technology will probably be effective in removing the other contaminants as well. After completion of the IRM, the RCRA monitoring program will be revised to meet the needs of final remedial measures that will be defined in future records of decision. During or after the final remedial measures, the RCRA monitoring program will again be revised to determine whether concentrations of contaminants at the point of compliance are below (and remaining below) their concentration limits. Fluoride will be monitored because it is present in the vadose zone beneath the former basins (discussed in Section 2.2).

1.3 Proposed Closure Strategy

The 183-H basins facility is a final-status treatment, storage, and disposal unit undergoing RCRA modified closure in accordance with the current postclosure plan contained in the RCRA permit as modified on December 26, 1996. A modified closure, as defined in the permit, requires that contaminated soils remaining at the unit meet Method C cleanup standards identified in the State of Washington's *Model Toxics Control Act* (RCW 70.105D) (MTCA). The DOE must provide institutional controls such as access controls and groundwater use restrictions. Reevaluation of the modified closure determination is required at least every 5 years after closure. The currently effective postclosure plan will be superseded by an update, to be incorporated into Chapter VI of the permit in December 1997.

Deep vadose zone nitrate and fluoride contamination could not meet numerical groundwater protection standards for modified closure (MTCA Method C) without excavation to the groundwater (Section 2.2). To achieve a modified closure, DOE demonstrated through groundwater modeling that levels remaining in the soil would not be a hazard to groundwater after covering the site with clean fill. This demonstration was approved by Ecology in its letter to DOE dated May 29, 1996, and allowed RCRA closure of the unit under a modified closure option. The demonstration was granted on an interim basis until a complete analysis of corrective action requirements could be made in association with CERCLA remedial actions. Final remedial action for the contamination in the vadose zone soil and the groundwater underneath the 183-H basins will be analyzed in a feasibility study and defined in a record of decision for the 100-HR-1 and/or 100-HR-3 operable units.

1.4 Responsibilities for Groundwater Monitoring

The owner/operator of the 183-H basins is DOE. The environmental restoration contractor, currently Bechtel Hanford, Inc. (BHI), is the co-operator of the basins. Pacific Northwest National Laboratory (PNNL)[a] has primary responsibility for RCRA monitoring; BHI is responsible for monitoring to support environmental restoration efforts.

The U.S. Environmental Protection Agency (EPA) and Ecology jointly administer the RCRA regulations in the State of Washington. The EPA retains oversight authority while delegating to Ecology the administration of a state program that is consistent with, or more stringent than, the corresponding federal program. At the time of operation and closure of the 183-H basins, EPA retained authority over the Land Disposal Restrictions Program (40 CFR 268) under the *Hazardous and Solid Waste Amendments of 1984*. Ecology's authorization included administration of the closure of RCRA treatment, storage, and/or disposal units.

1.5 Organization of this Plan

This plan consists of six chapters, including this Introduction. Chapter 2.0 presents the operational and physical description of the basins, along with the characteristics of the discharged waste. Chapter 3.0 defines the stratigraphy, hydrology, and chemistry beneath the basins. Chapter 4.0 defines the RCRA groundwater monitoring program, including objectives, constituents, concentration limits, point of compliance, compliance period, wells used in the monitoring activities, sampling and analysis program, and groundwater-flow direction. Chapter 5.0 outlines data management and reporting. Chapter 6.0 lists the references cited. Three appendixes provide supporting information.

(a) PNNL is operated by Battelle for DOE.

2.0 Description of 183-H Solar Evaporation Basins

This chapter provides an overview of physical structures, operational history, and waste characteristics for the 183-H basins. More detail is provided in the closure/postclosure plan (DOE 1991).

2.1 Operational History and Physical Structure

Use of the 183-H basins began in July 1973, when liquid was pumped into basin 1 but discharges ceased after 2 months. Discharge resumed in 1975 and continued until 1978, when nitrate contamination in a downgradient well was attributed to wastes from basin 1. Basins 2 and 3, with sprayed-on liners of a polyurethane material, were used beginning in 1977 and 1978 and basin 1 was permanently retired. Basin 4, with a sprayed-on butyl and Hypalon[a] liner, was also used beginning in October 1982. Basins 2, 3, and 4 were used until 1985.

Basin 1 solids and sludges were removed in 1985. Basins 2, 3, and 4 held waste consisting of three distinct layers: a basal crystalline layer, a sludge layer, and a liquid layer on top. In 1986, the liquid waste was solidified inside lined drums. The sludge and crystalline layers were removed from the basins by manually shoveling and/or scooping the material into the drums. Basins 1 and 4 were subsequently cleaned by wet sandblasting. By the end of 1990, all waste had been removed from the 183-H basins.

Sediments were removed beneath the entire "footprint" of the basins to a depth of ~1 m in 1996. Sediments were excavated to a depth of 6 m beneath former basin 1, where deeper contamination was found. The excavation was filled with clean soil to meet the surrounding grade. The site is scheduled to be revegetated in the fall of 1997.

The 183-H basins were located beside the Columbia River in the northern portion of the Hanford Site (Figure 1). Each basin was ~16 m wide and 39 m long and contained a 5-m-deep sedimentation basin and a smaller, 3-m-deep flocculation basin (Figure 2). The basins were surrounded by earthen berms.

The concrete basins were originally part of the 183-H Filter Plant, which operated concurrently with 100-H Reactor (1943 to 1964). At that time, there were 16 basins. In 1974, the filter plant and all but four basins were decontaminated and demolished. The remaining basins were modified to seal openings and to install a pipeline before being used for waste treatment.

(a) Hypalon is a trademark of E. I. DuPont de Nemours and Company, Inc.

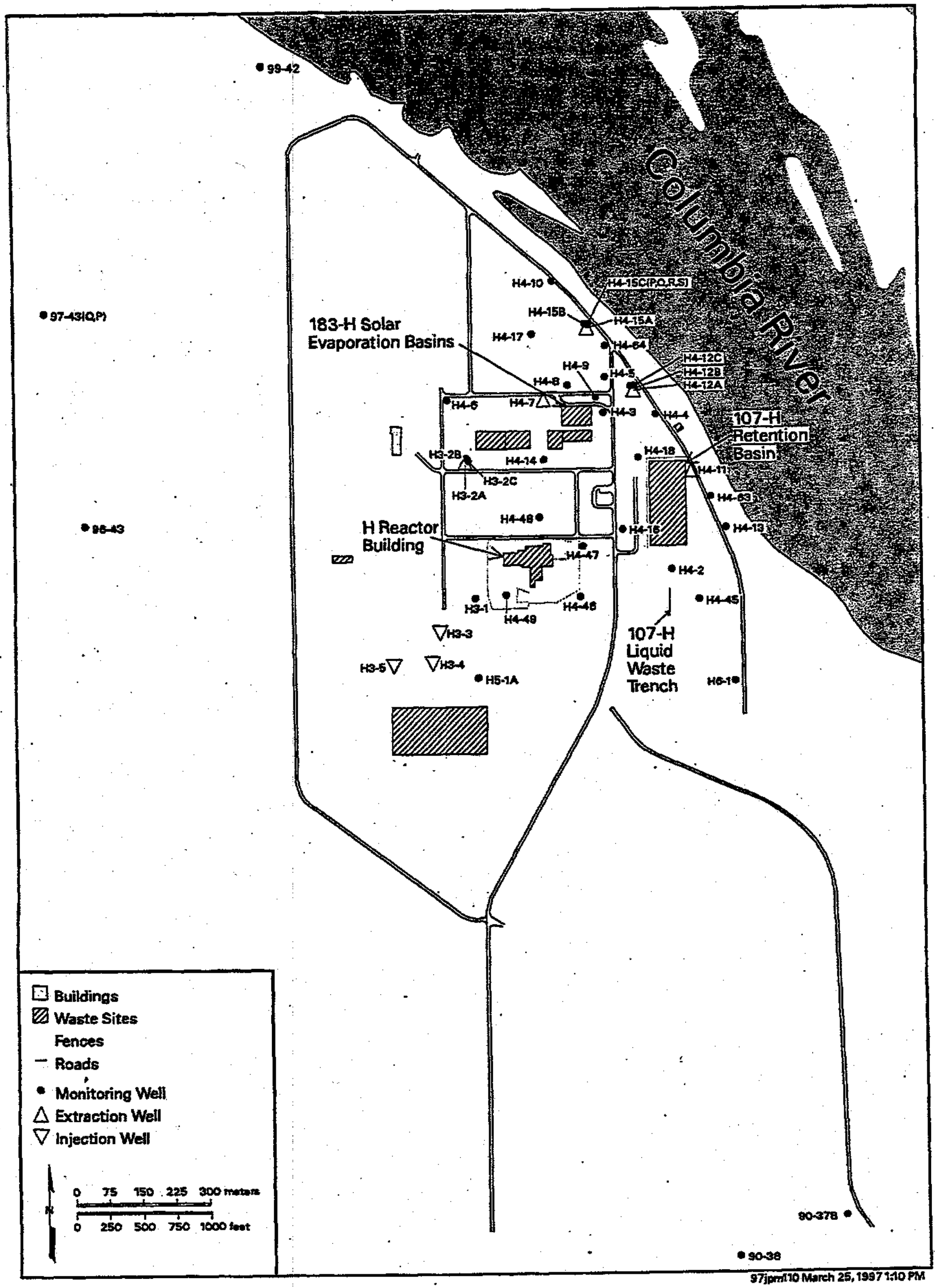


Figure 1. Location of the 183-H Solar Evaporation Basins

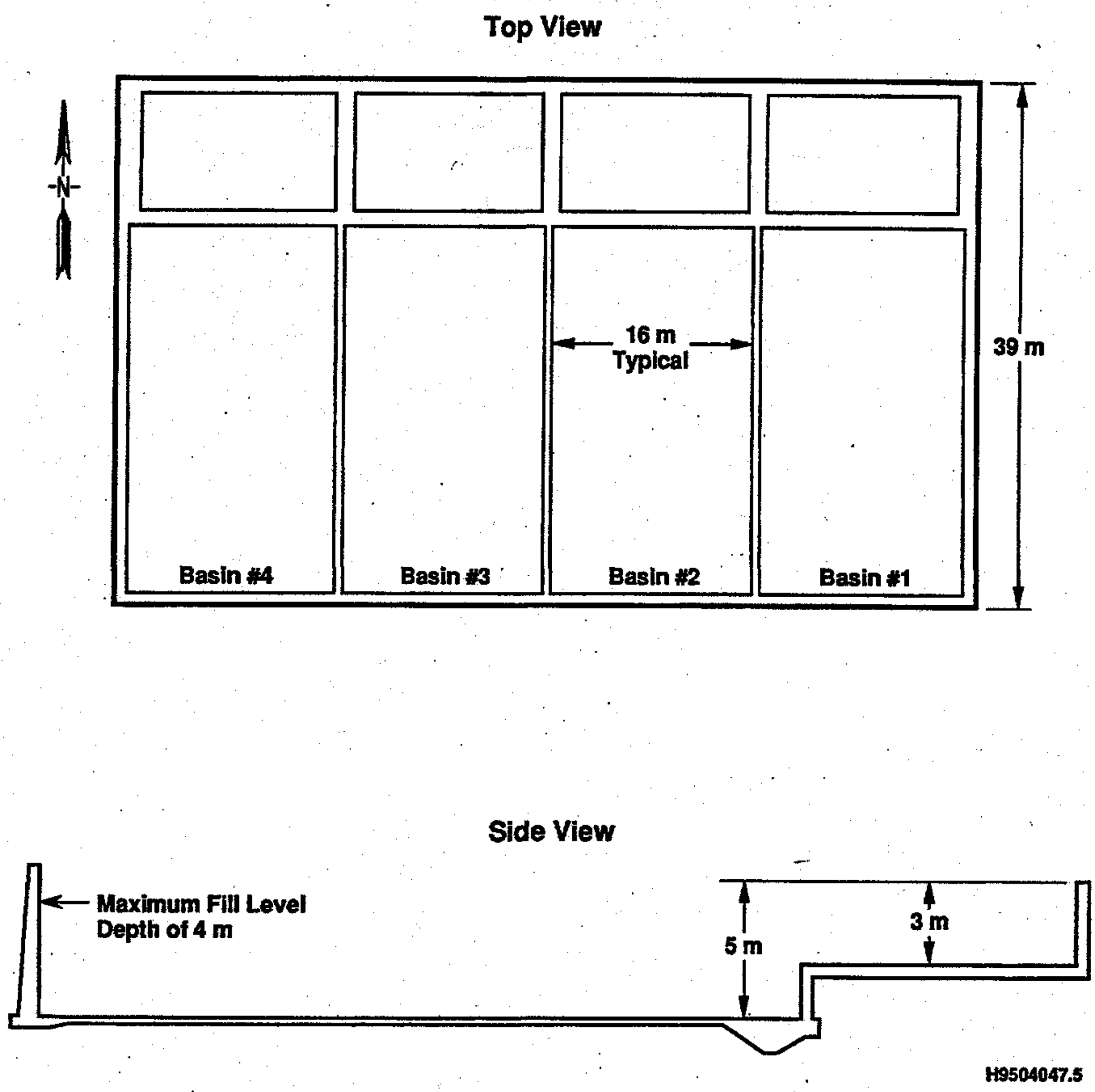


Figure 2. Dimensions of the 183-H Solar Evaporation Basins

2.2 Waste Characteristics

Waste was discharged to the basins from 1973 to 1985. During that time, 9,621,000 L of routine waste were discharged (DOE 1991). The routine waste consisted of spent acid etch solutions (i.e., chromic, hydrofluoric, nitric, and sulfuric acids), typically neutralized with sodium hydroxide. Metal constituents included aluminum, chromium, copper, manganese, nickel, silicon, uranium, and zirconium (primarily in the form of precipitates after neutralization). The resultant slurry of liquid and metal precipitates was discharged into the basins.

Chemical analyses were not performed routinely on the waste discharged during the operating life of the basins; however, chemical waste disposal permits indicate that some of the waste was corrosive (high and low pH). Up to 700 µg/L of chromium were found in a monthly composite sample.

The neutralized waste contained high concentrations of nitrate and copper from the nitric acid used in the copper-stripping procedures. Chromium waste included hexavalent chromium, mostly from the chromic acid used in fuel fabrication. After 1983, hexavalent chromium was reduced to its trivalent state before disposal. Two other minor sources of chromium were the etching of stainless steel (mostly trivalent chromium) and the disposal of various industrial solutions.

The routine waste included uranium and technetium-99, causing the material to be categorized as nontransuranic, low-level, radioactive waste.

Nonroutine waste discharged to the basins periodically included unused chemicals and spent solutions from miscellaneous processes, development tests, and laboratories. These discharges included the following components: cadmium and cadmium compounds; copper and copper compounds; oxalic acid; cyanide, mercury, and lead compounds; barium perchlorate; hydrazine; chromium and chromium compounds; vanadium pentoxide; nickel and nickel compounds.

Analyses of basin concrete indicated chemical contamination above MTCA groundwater protection standards but below MTCA Method C industrial direct soil exposure standards. The concrete also contained contaminants above dangerous waste characteristic or criteria designation limits for arsenic, barium, beryllium, cadmium, chromium, lead, mercury, nickel, selenium, and silver (Butcher and Galbraith 1995; BHI 1996). Sampling of concrete cores through the basin indicated that listed constituents (i.e., vanadium pentoxide, formic acid, and cyanide salts) were contained in the concrete at levels below MTCA Method B residential direct soil exposure and groundwater protection standards.

After removal of the basin structures, sediments beneath the basin footprint were excavated and sampled. Results are discussed by Kramer (1996). Sediment removal began in February 1996. Initially, a 0.6-m layer was taken off the entire footprint of the basins. An overlying grid was constructed, and 11 sample locations were chosen at random, with one exception. One specific location of interest was sampled beneath basin 1, where high arsenic concentrations had been found through previous sampling and this area was targeted for more information gathering. The results of this sampling effort concluded that all constituents were removed from shallow sediments to levels below residential limits, with the exception of arsenic and the mobile constituents that were known to be found in deeper vadose sediments (e.g., hexavalent chromium, nitrate, and fluoride). Deep contamination was indicated only under basin 1. On completion of shallow sediment removal, the remaining footprint was surveyed and released from its designation as a radiological area.

Concentrations of arsenic in the shallow sediment ranged from less than detection to 9 mg/kg, with a mean of 6.5 mg/kg. (Samples from a nearby former orchard had a mean arsenic concentration of 11.4 mg/kg.) The maximum concentration of hexavalent chromium was 1 mg/kg.

Based on the results of the shallow sampling, more sediment was excavated from the area beneath former basin 1, and samples from a depth of 3.4 m were analyzed. Field screening techniques were used to collect most of the data. Hexavalent chromium was detected in deep sediment only at very low levels. Arsenic also met cleanup standards at 2.7 m. Nitrate and fluoride contamination was found much deeper than earlier characterization information indicated, so the sediments were excavated to 4.6 m below basin 1 (Kramer 1996). Also, a test pit was dug to 7.6 m. Analyses of this sediment revealed that nitrate and fluoride contamination above MTCA Method B groundwater protection standards was present. The depth to groundwater is 12 to 13 m.

Fluoride concentrations in the deep sediments ranged from less than detection to 542 mg/kg. Nitrate concentrations ranged from 26.9 to 1,930 mg/kg, with a mean of 919 mg/kg. Both nitrate and fluoride had higher concentrations in the deep sediments (3.4 m) than in the shallow sediments (1.1 m). The maximum concentration of hexavalent chromium at a depth of 3.4 m was 1.07 mg/kg.

3.0 Hydrogeology

This chapter describes the stratigraphy, physical hydrology, and groundwater chemistry beneath the 100-H Area, with emphasis on the shallow sediments.

3.1 Stratigraphy

The Hanford Site is underlain by unconsolidated sediments and the Columbia River Basalt Group. Unconsolidated sediments at the 100-H Area include Hanford gravels and the Ringold Formation (Figure 3). The stratigraphy of the 100-H Area has been described by Lindsey and Jaeger (1993).

Surface sediments at the 100-H Area include Holocene deposits and backfill, generally less than 1 m thick. The Hanford formation (informal name) lies under this veneer and comprises almost exclusively coarse-grained sand and granule to boulder gravel. These gravels are uncemented and matrix poor. Strata at the base of the Hanford formation may contain material eroded from the underlying Ringold Formation, including muddy gravels mixed with quartz-rich sands. The thickness of the Hanford formation ranges from 10 to 19 m across the 100-H Area.

The Ringold Formation is ~81 m thick beneath the 100-H Area, is relatively fine grained, and has gravel units of less than a few meters thick. This formation includes the following three main stratigraphic intervals: overbank/paleosol deposits, sand and interbedded overbank/paleosol deposits, and the lacustrine-dominated lower mud unit.

3.2 Physical Hydrogeology

The two major aquifer systems present beneath the 100-H Area are the suprabasalt system and the basalt/interbed system (see Figure 3). Within the suprabasalt system, the saturated portion of the Hanford formation is defined as the unconfined or uppermost aquifer, which is 1.8 to 5.5 m thick. The underlying Ringold sediments are finer grained and form the base of the aquifer. Confined aquifers are present in coarser-grained units within the Ringold Formation.

Liikala et al. (1988) provided estimates of transmissivity based on aquifer and laboratory tests. A range of results for different hydrologic units is presented in Tables 1 and 2. The unconfined Hanford formation is, in general, more transmissive than the underlying units, though the ranges of horizontal conductivity overlap.

Groundwater generally flows from west to east in the uppermost aquifer beneath the 100-H Area and discharges to the Columbia River. The direction of groundwater flow is interpreted from water-table maps and from the shape of the contaminant plume beneath the 183-H basins. The plume shape is

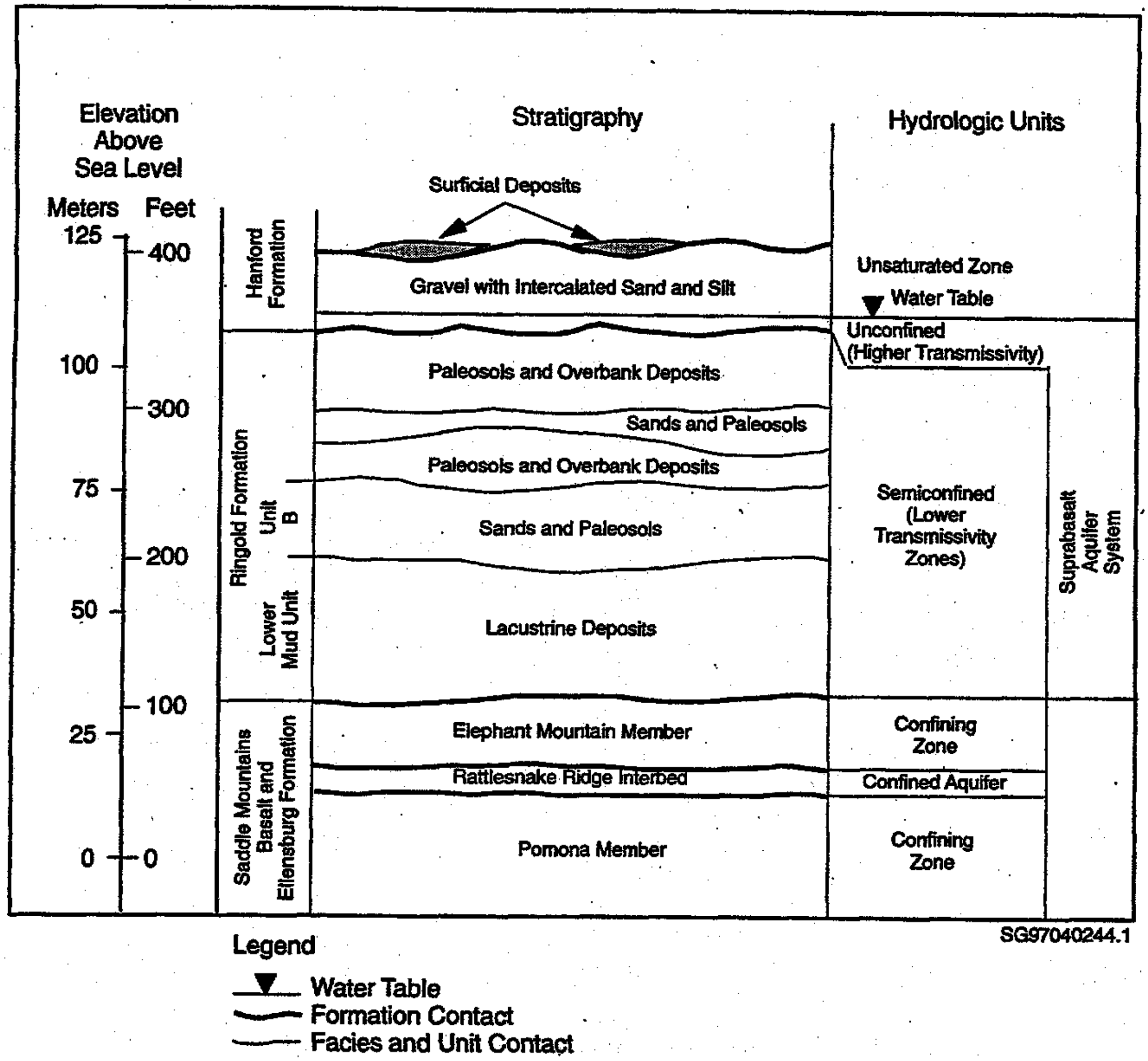


Figure 3. Generalized Hydrogeology of the 100-H Area

believed to indicate an "average" direction of flow from west to east. The water table is affected by daily and seasonal fluctuations in river stage, depending on dam operation upstream. When the river stage is high for weeks or months, the hydraulic gradient in the aquifer reverses near the river, and river water can flow into the aquifer (Figure 4). When the river level drops, this water flows from the bank back into the river. Figure 5 illustrates a more representative water table constructed from average water levels over a representative year.

Table 1. Aquifer Test Results (from PNL 1987 and Liikala et al. 1988)

Well	Transmissivity		Hydraulic Conductivity	
	ft^2/d	m^2/d	ft/d	m/d
Unconfined Aquifer (Hanford formation)				
199-H3-2A	19,000	1,800	1,900	580
199-H3-2B	600	56	100	30
199-H4-7	690[a]	64	70[a]	21
199-H4-10	53,500	4,970	5,900	1,800
199-H4-11	1,070	99	70	21
199-H4-12A	2,670	250	210	64
199-H4-12B	635	59	50	15
199-H4-13	4,240	390	420	130
199-H4-14	1,050	98	250[b]	76
199-H4-15A	2,340	220	200	60
199-H4-15B	5,530	514	460	140
199-H4-16	2,200	204	220	67
199-H4-18	550	51	80	24
Ringold Silty Sand and Gravelly Silty Sand (confining unit below unconfined aquifer)				
199-H3-2C	390	36	39	12
199-H4-12C	620	58	62	19
199-H4-15Cr	1,760	164	350	107
Ringold Upper Confined Aquifer				
199-H4-15Cq	0.7	0.07	0.14	0.043

Original transmissivity values in ft^2/d. Hydraulic conductivity calculated as $K = T/b$, where b = screened thickness (thickness of screened aquifer at the time of testing; i.e., water table to bottom of temporary screen or thickness of temporary screen, whichever is less).

(a) Liikala et al. (1988) state this number is an estimate.
(b) Well pumped dry.

Table 2. Vertical Hydraulic Conductivity

Well	Depth (ft)	Vertical Hydraulic Conductivity	
		ft/d	m/d
199-H4-12C	125 to 127	1.5E-02	4.6E-03
199-H4-15C	120 to 122	2.9E-03	8.8E-04
Laboratory analyses of split-spoon samples from "silty sand and gravelly silty sand" units (Liikala et al. 1988).			

No significant upward or downward gradient is apparent between the top of the Ringold Formation and the uppermost aquifer. Deeper confined aquifers in the Ringold Formation have higher heads than the unconfined aquifer (Liikala et al. 1988).

3.3 Groundwater Chemistry

Groundwater in the uppermost aquifer beneath the 100-H Area has been affected by liquid wastes discharged at various facilities, including the 183-H basins. The following contaminant plumes are present in the area: gross alpha/uranium, gross beta/technetium-99, tritium, nitrate, chromium, sulfate and sodium. These contaminants were all present in the wastes discharged to the 183-H basins, though chromium has other sources in the 100-H Area as well. Figures 6 through 9 illustrate the distribution of the major contaminants in the uppermost aquifer in January/February 1994. Maps constructed from data collected in 1995 and 1996 show plumes are more localized around the former basins because high river stage had diluted contaminants in groundwater near the river.

A peak in contaminant concentrations in wells monitoring the 183-H basins was observed in 1978, and is assumed to be the result of leakage from basin 1 (Figure 10). Waste was subsequently transferred from that basin to the adjacent lined basins. A second peak in contaminant concentrations was observed in 1986, and is believed to relate to cleanup activities in basin 1 (Peterson 1994). Smaller fluctuations in contaminant concentrations are related to changing stage of the Columbia River (Peterson 1990).

Contaminant concentrations generally decreased between 1986 and 1992 (Figures 11 through 14). From 1993 through 1996, concentrations have been higher, though seasonal lows are observed during periods of high river stage. The reason for the recent increase is unknown; no cleanup activities were under way that had a potential for affecting groundwater, and the increases do not appear to relate to river stage.

There is no conclusive evidence of downward migration of waste constituents from the 183-H basins based on wells completed in deeper aquifers. Well 199-H4-12C is directly in the area of basin contamination but is completed at mid-depth in a silty sand to gravelly silty sand unit in the Ringold Formation. Two adjacent wells, 199-H4-12A and 199-H4-12B, are completed at the top and bottom of

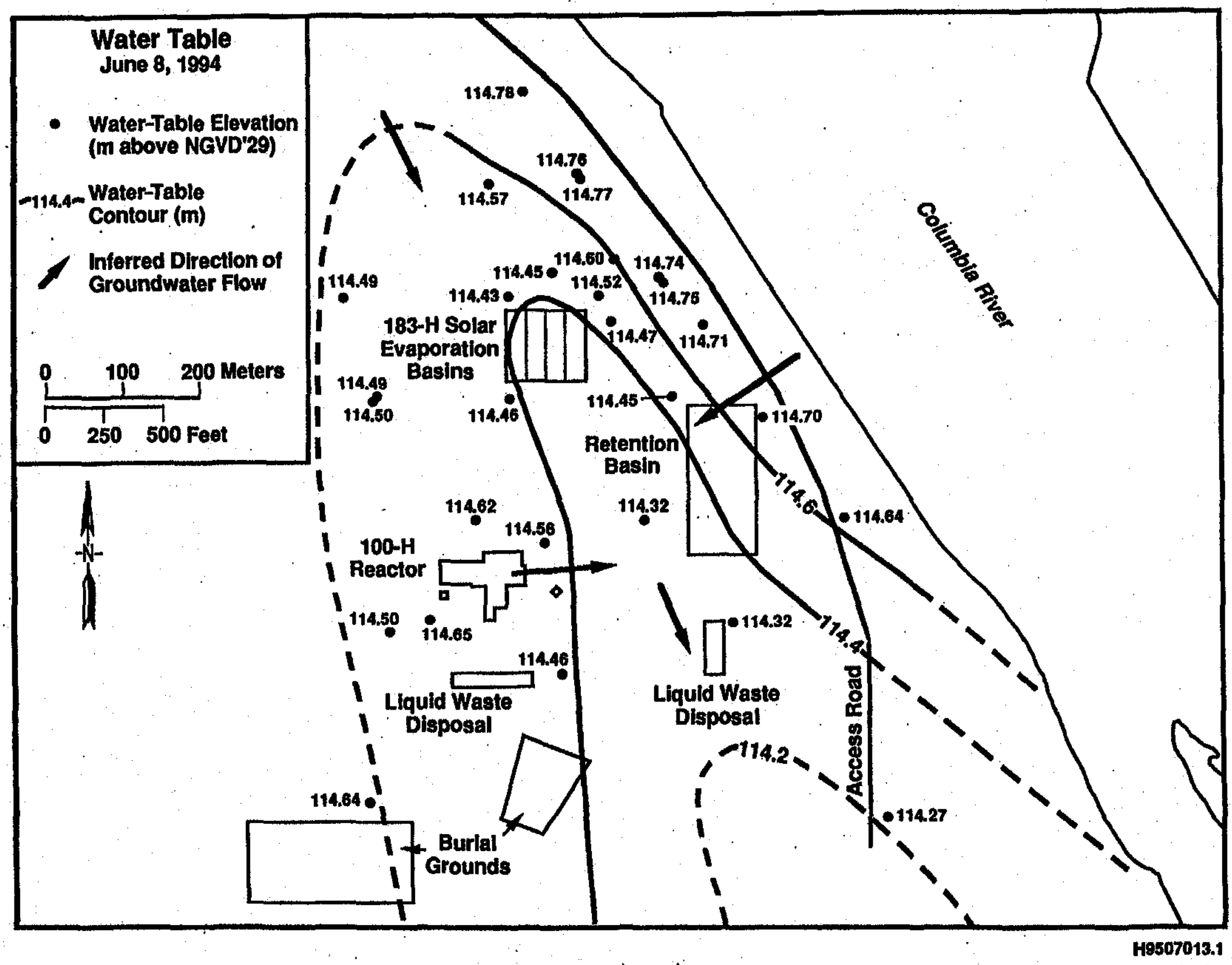


Figure 4. Water Table in the 100-H Area, June 1994

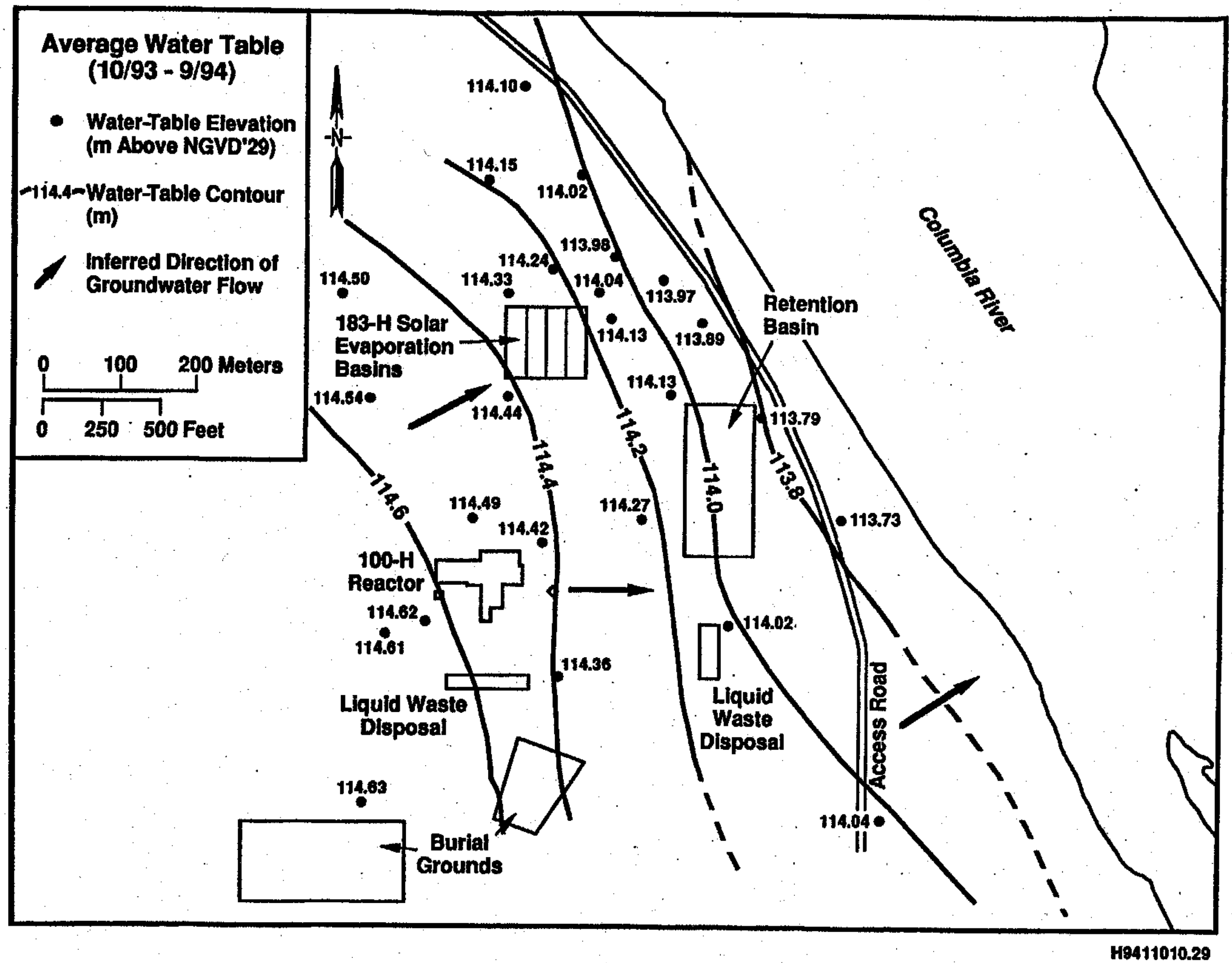


Figure 5. Average Water Table in the 100-H Area

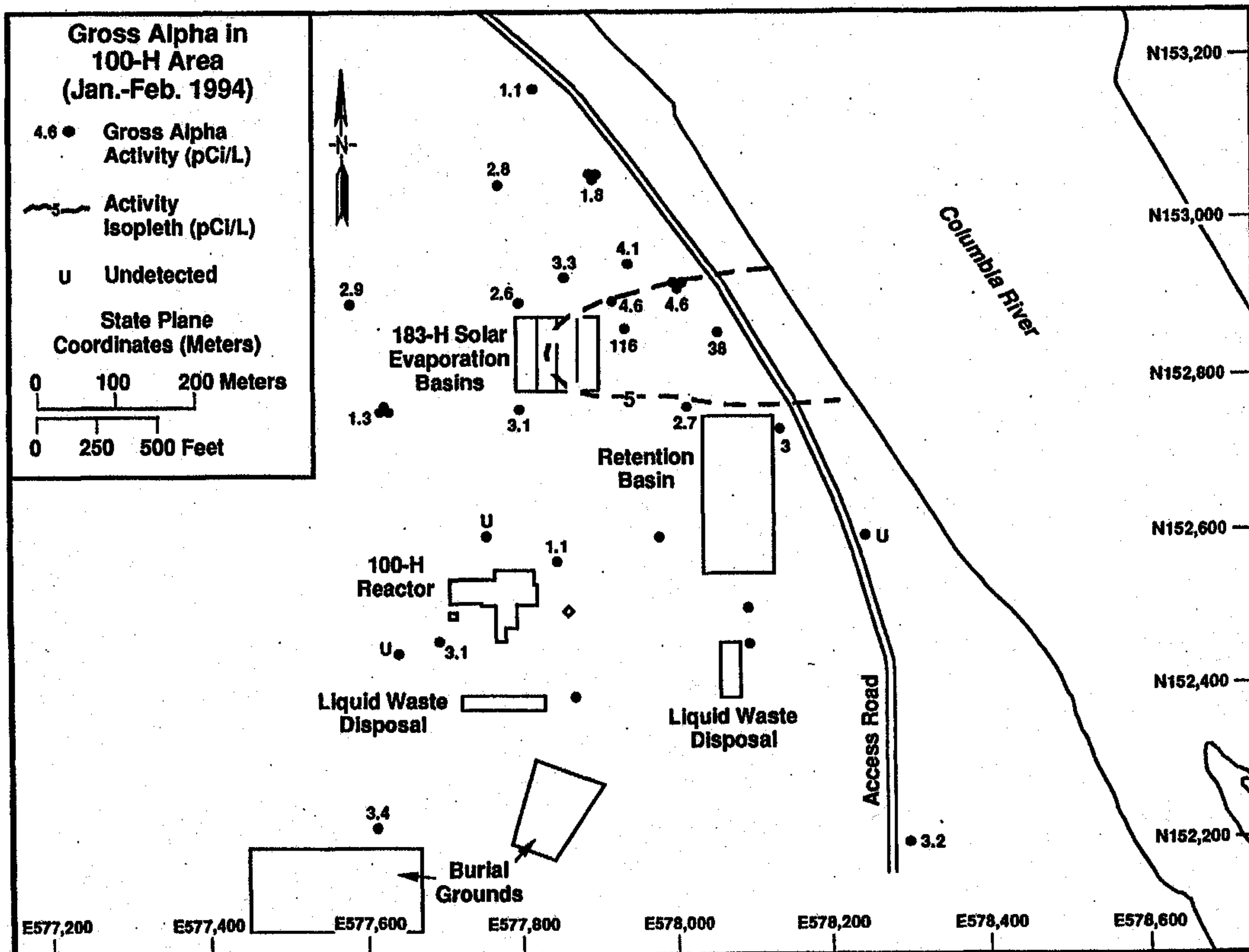


Figure 6. Gross Alpha in the Uppermost Aquifer Beneath the 100-H Area, January and February 1994 (from Hartman 1995)

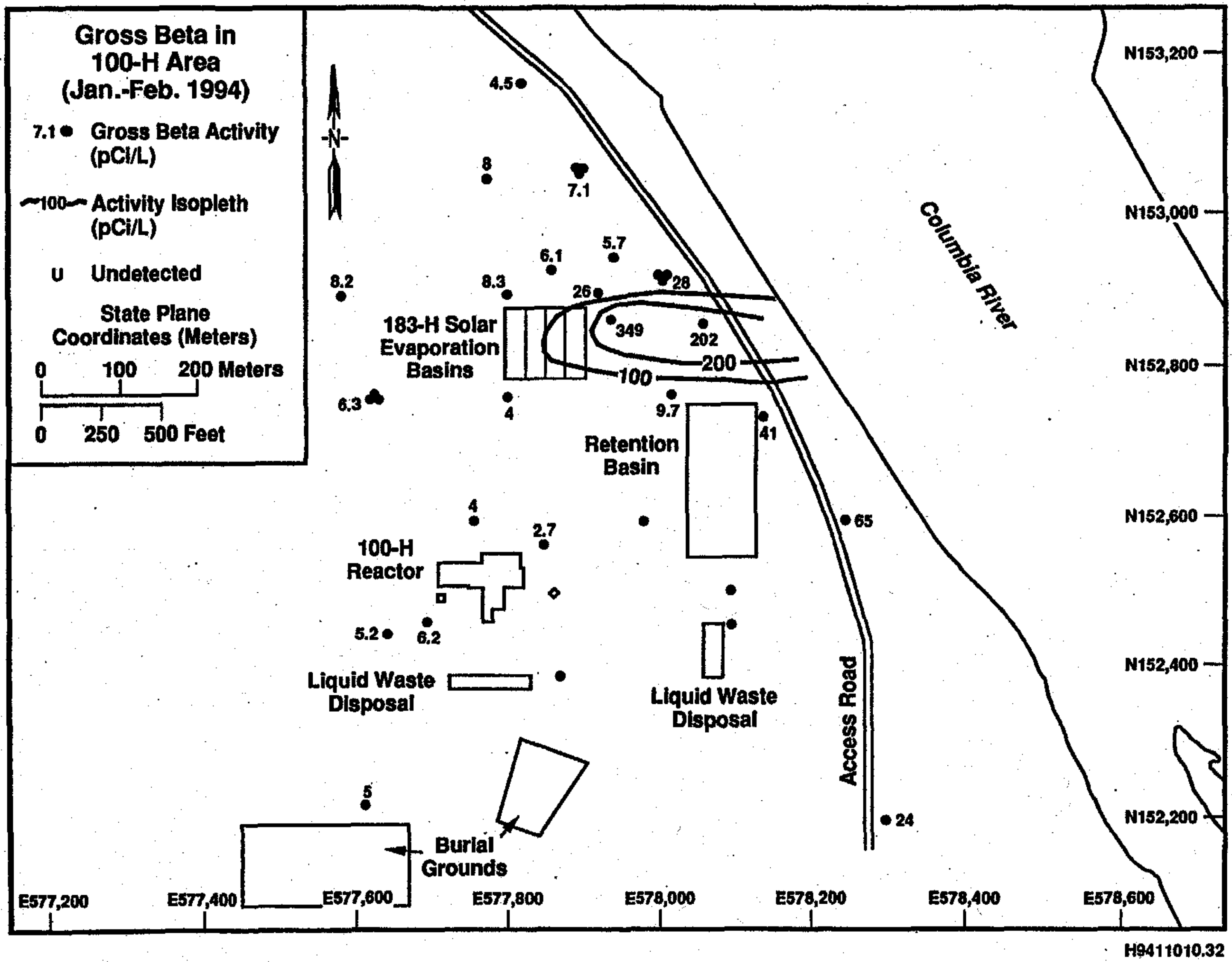
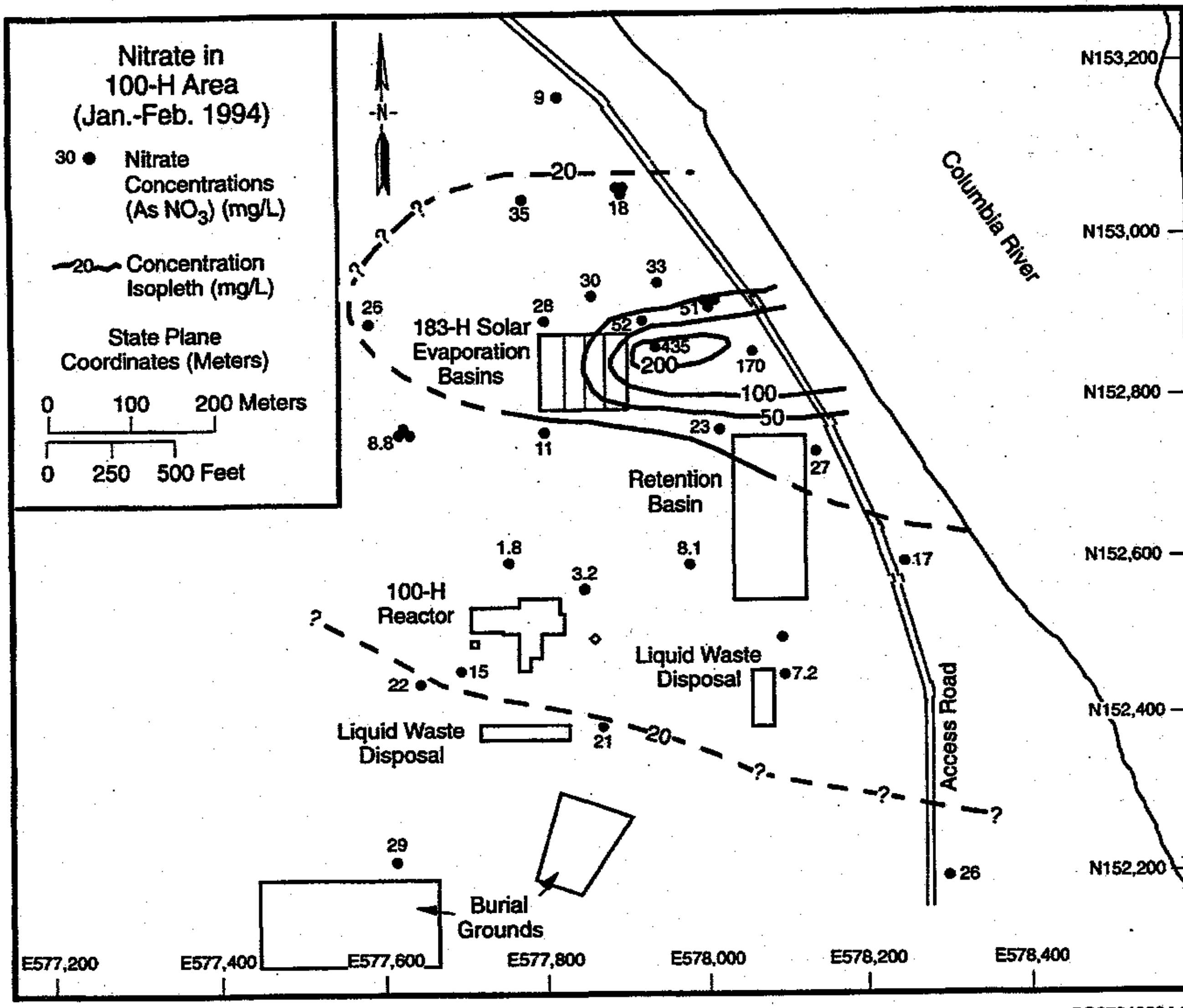


Figure 7. Gross Beta in the Uppermost Aquifer Beneath the 100-H Area, January and February 1994 (from Hartman 1995)



SG97040224.3

Figure 8. Nitrate in the Uppermost Aquifer Beneath the 100-H Area, January and February 1994 (from Hartman 1995)

the unconfined aquifer, respectively. Technetium-99, uranium, and nitrate are low in well 199-H4-12C (Figures 15 and 16 illustrate the trends for uranium and nitrate); chromium is higher than in the shallower wells (Figure 17). If the 183-H basins were the source of the chromium, the other 183-H waste indicators would also be elevated, but these constituents were low in well 199-H4-12C. Thus, the source of deep chromium contamination is unclear.

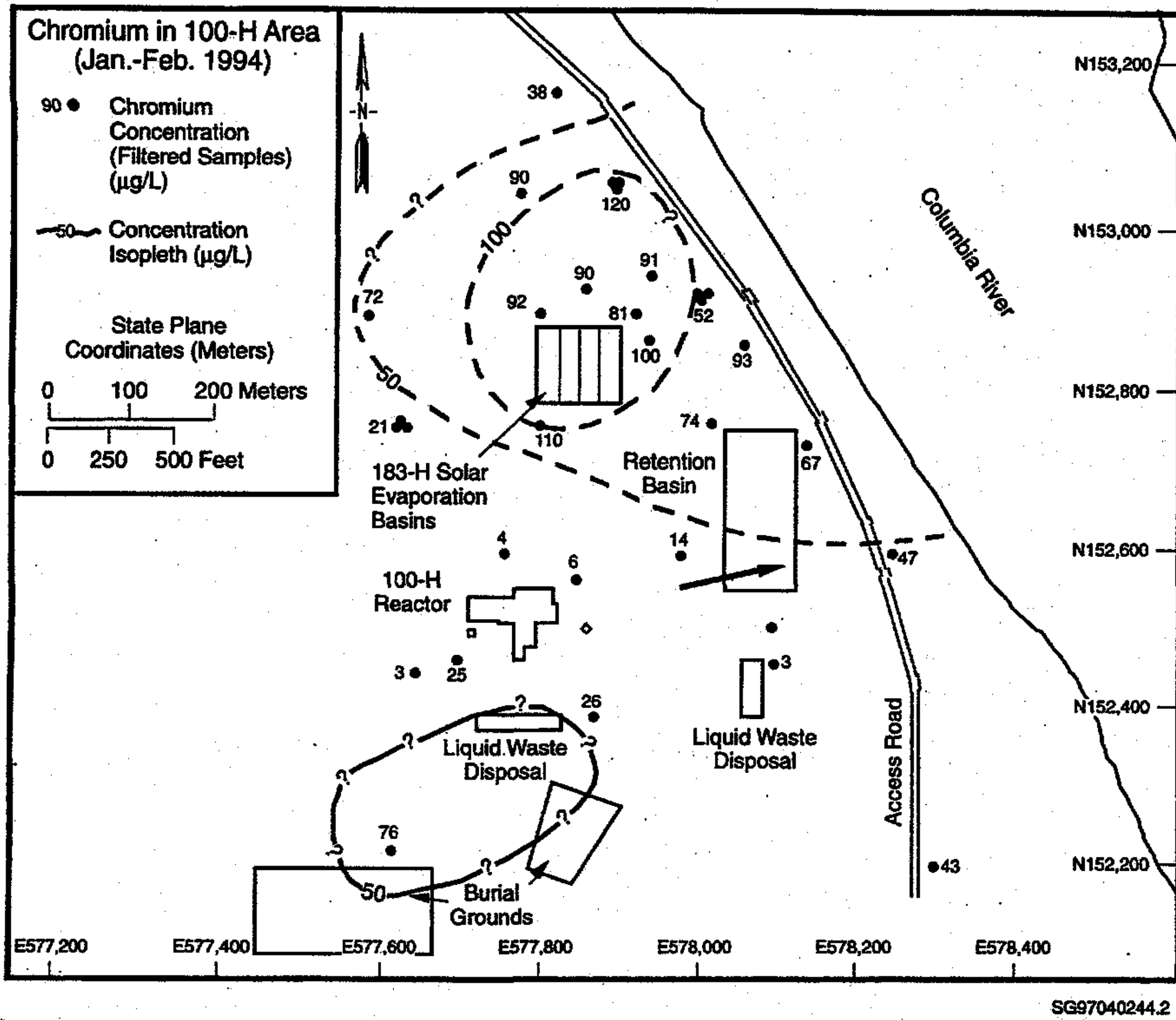


Figure 9. Chromium in the Uppermost Aquifer Beneath the 100-H Area, January and February 1994 (from Hartman 1995)

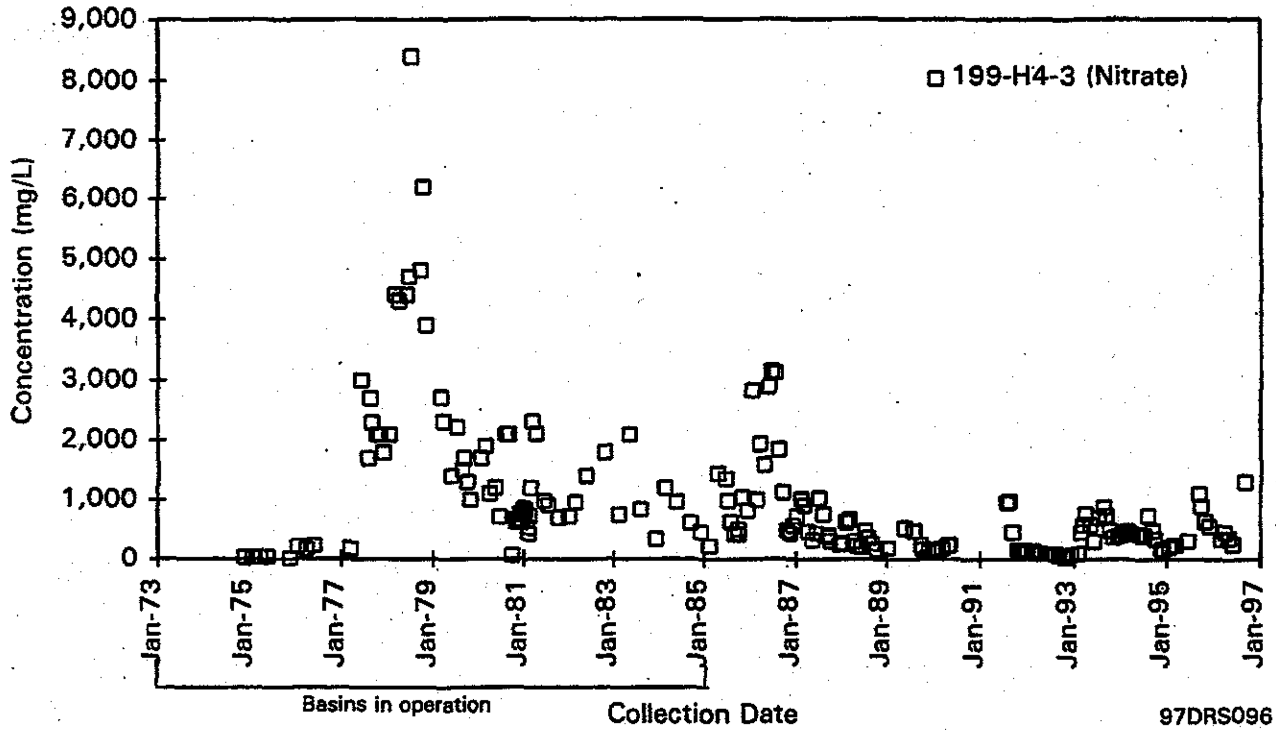


Figure 10. Nitrate Versus Time in Well 199-H4-3, 1974 Through 1996

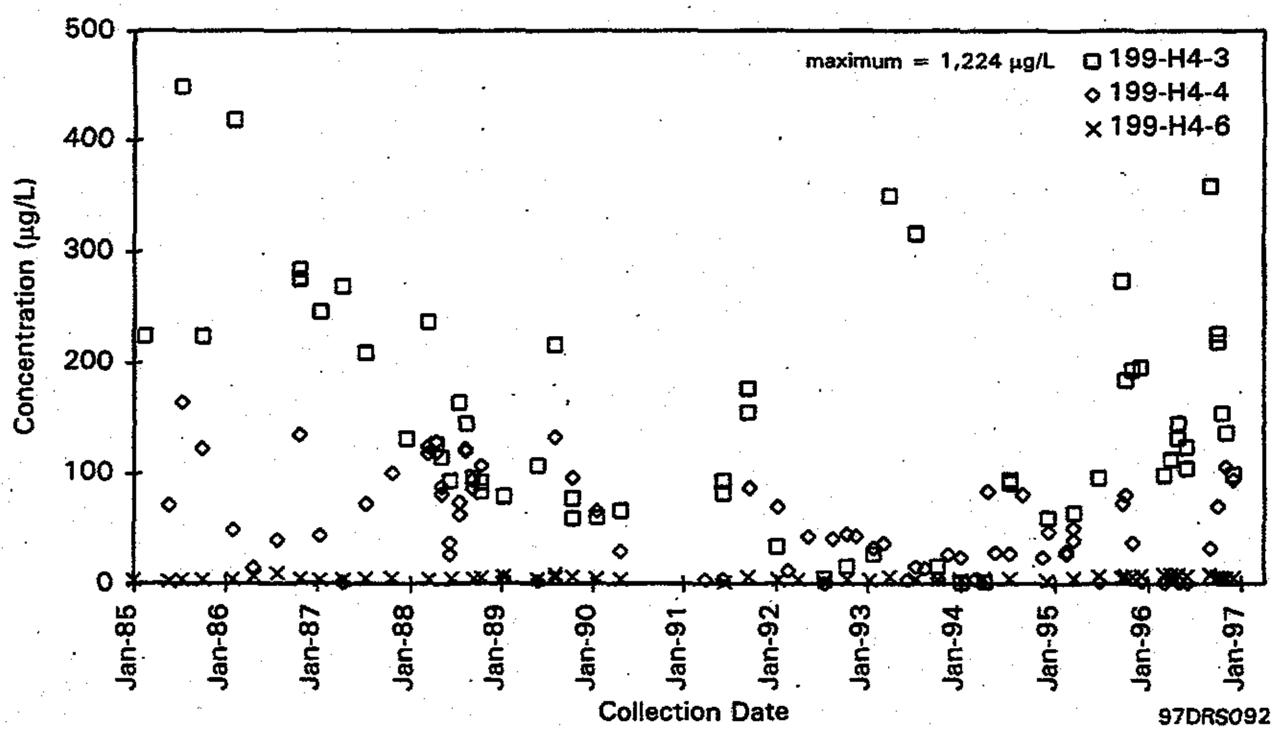


Figure 11. Uranium Versus Time in Groundwater at the 183-H Solar Evaporation Basins (well 199-H4-3 had a maximum value of 2,090 µg/L in 1986)

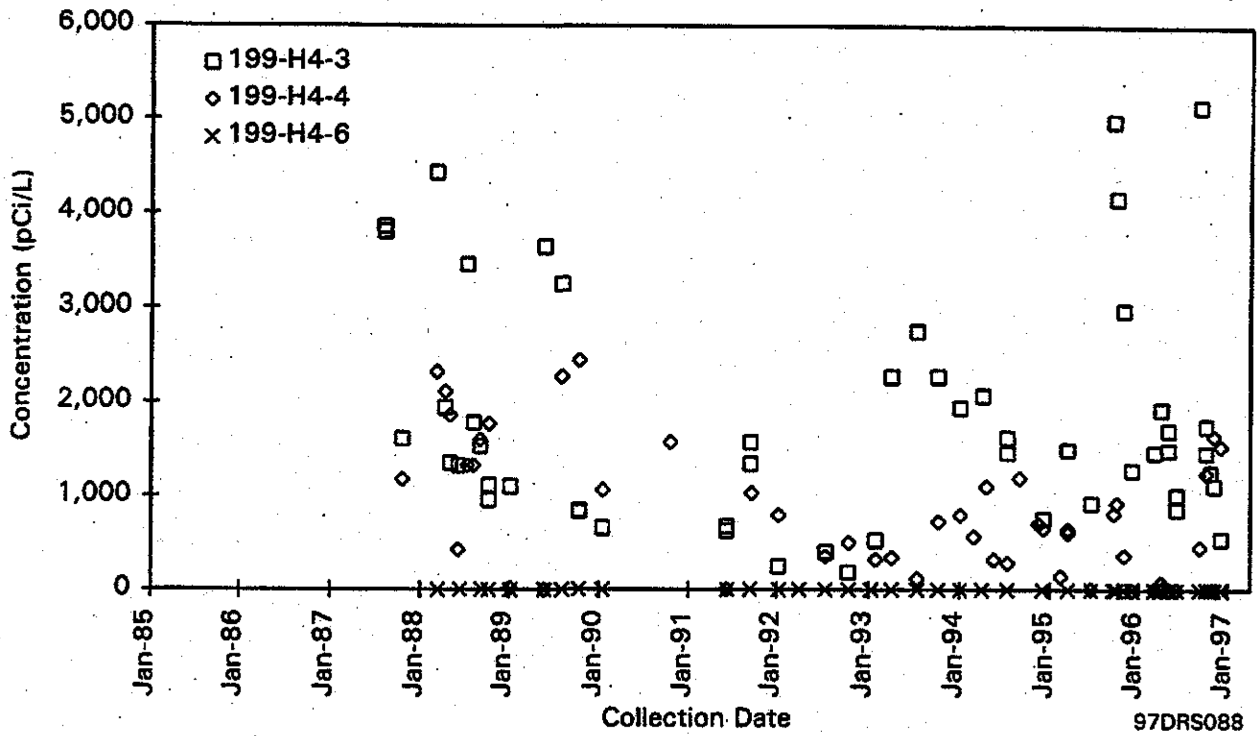


Figure 12. Technetium-99 Versus Time in Groundwater at the 183-H Solar Evaporation Basins

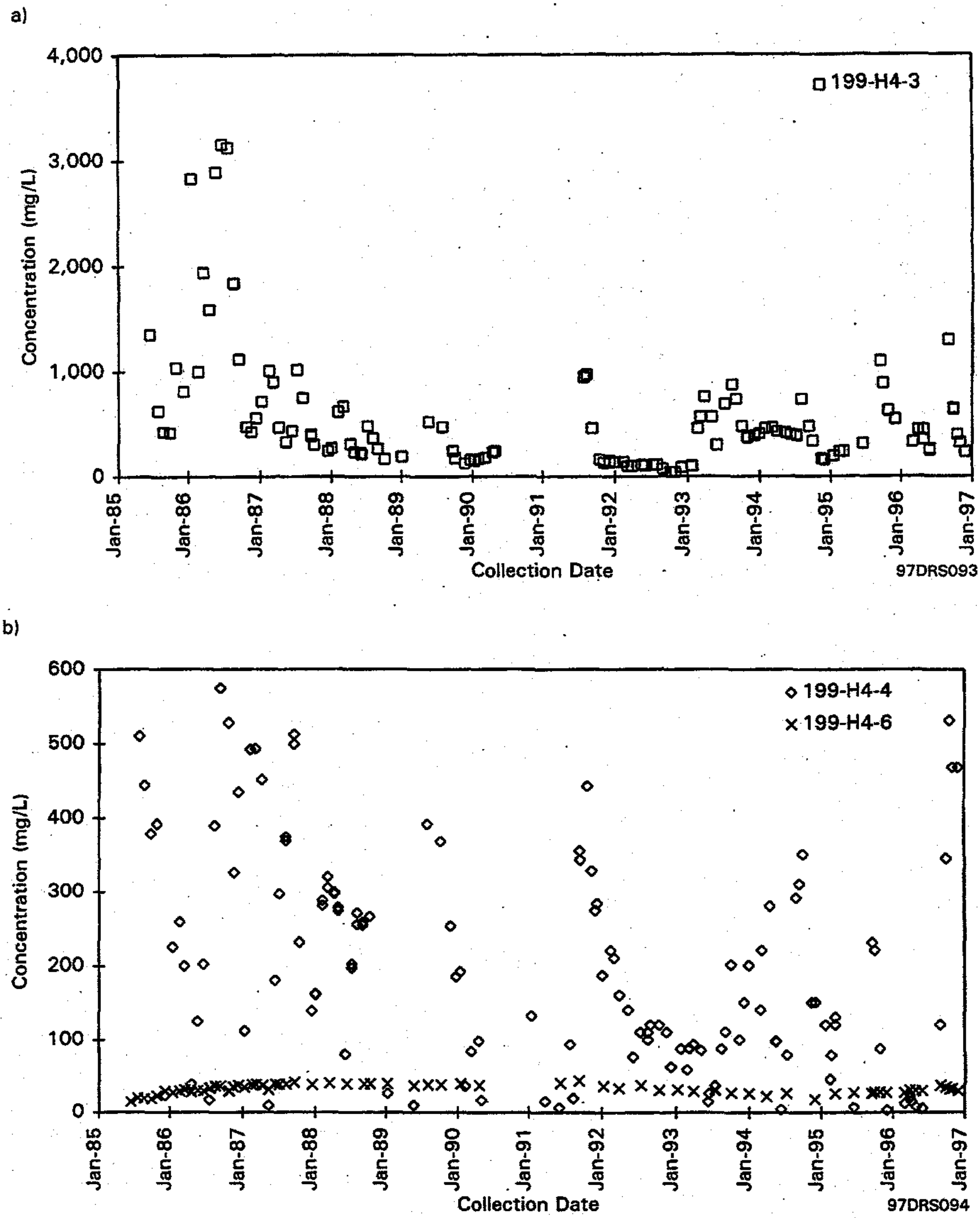


Figure 13. Nitrate Versus Time in Groundwater at the 183-H Solar Evaporation Basins

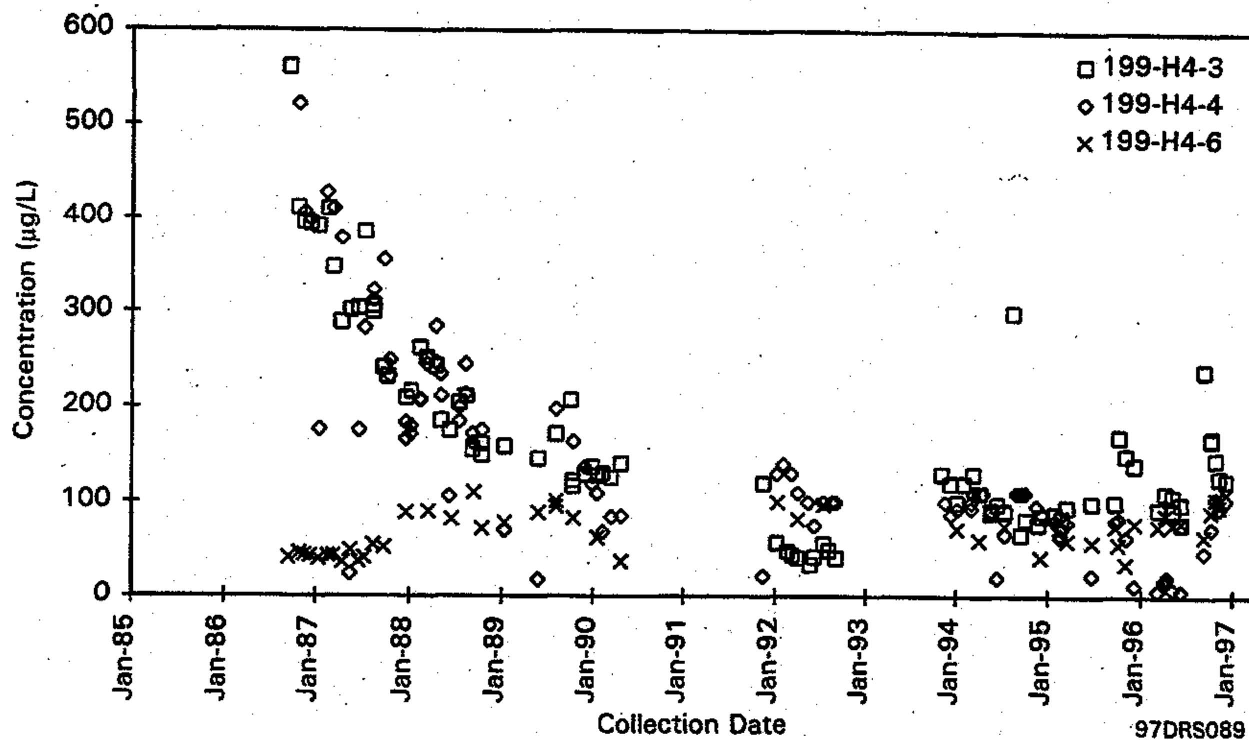


Figure 14. Chromium Versus Time in Groundwater at the 183-H Solar Evaporation Basins

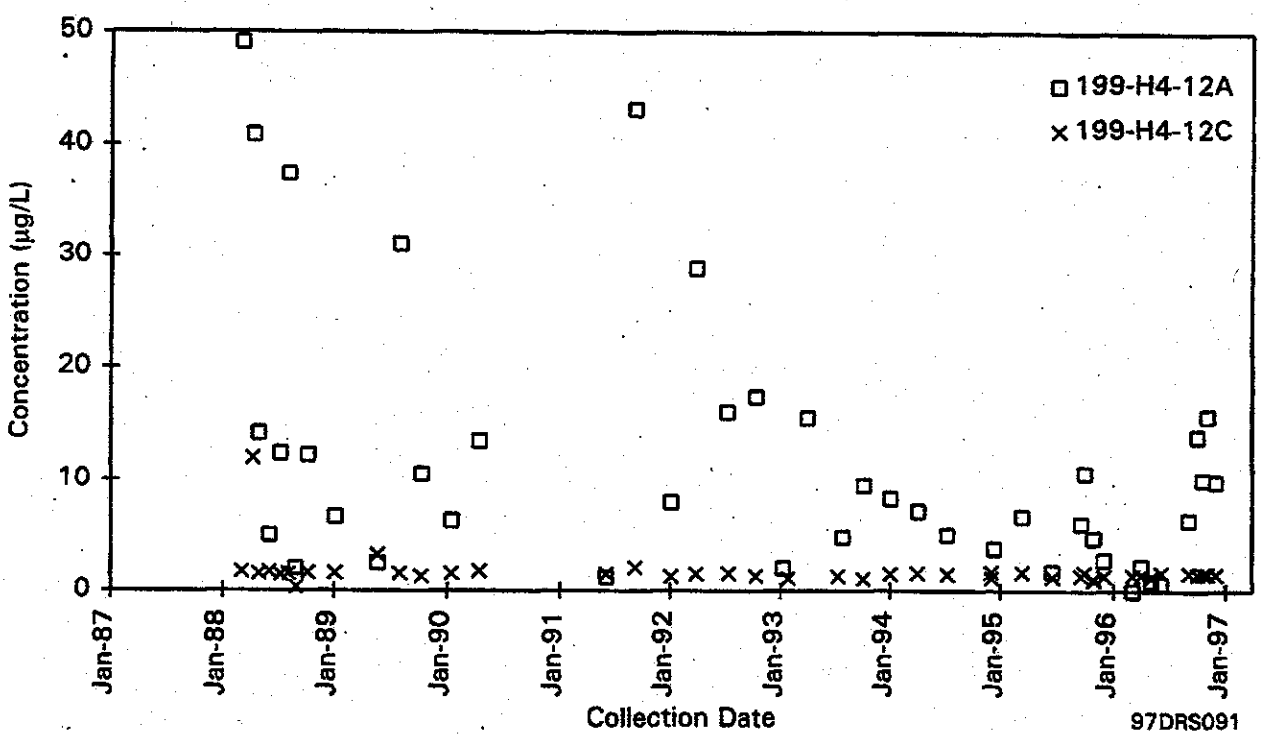


Figure 15. Uranium Versus Time in Wells 199-H3-12A (water table) and 199-H4-12C (Ringold)

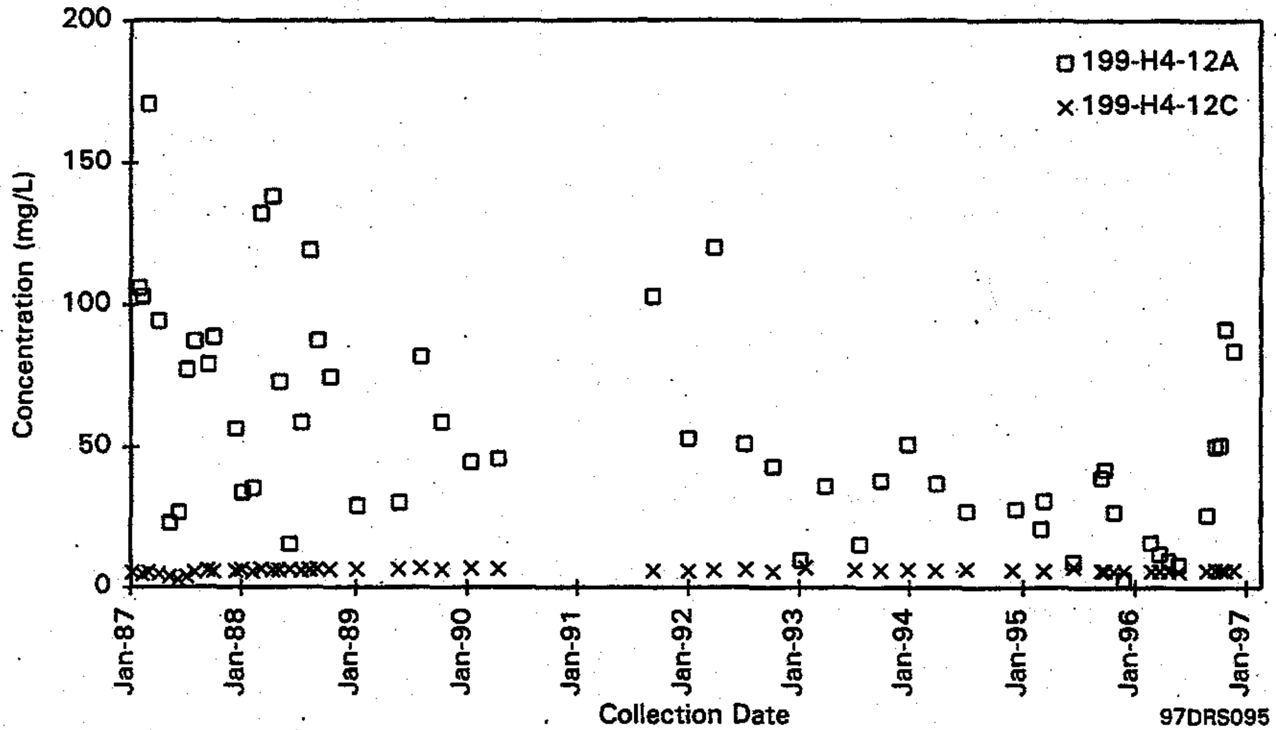


Figure 16. Nitrate Versus Time in Wells 199-H3-12A (water table) and 199-H4-12C (Ringold)

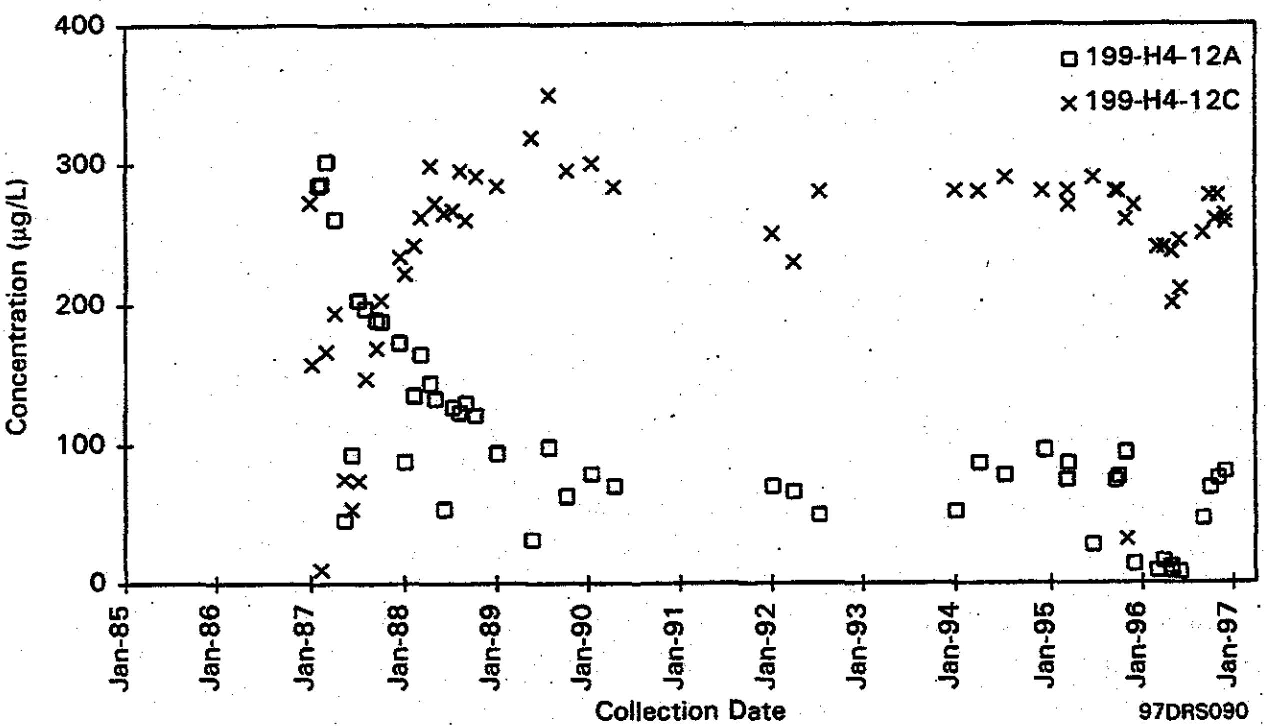


Figure 17. Chromium Versus Time in Wells 199-H3-12A (water table) and 199-H4-12C (Ringold)

4.0 Groundwater Monitoring Program

This chapter proposes the first phase of a final-status RCRA groundwater monitoring program for the 183-H basins. The groundwater monitoring program is designed to achieve the following goals in a technically sound and cost-effective manner:

- protect human health and the environment
- comply with the intent of final-status groundwater monitoring requirements for a corrective action program (WAC 173-303-645)
- contribute to groundwater investigation or remediation.

A monitoring network, consisting of a subset of existing wells, is defined, and the methods for sampling and analysis are described.

The elements of this monitoring program were determined through a data quality objectives process (EPA 1993). The primary purpose of this process is to ensure that the type, quantity, and quality of data used in monitoring are appropriate for their intended applications.

The well network, constituent list, and sampling frequency were proposed to Ecology in March 1997 (Appendix A). The monitoring network comprises four wells, compared to eight in the compliance program. Each well will be sampled once each year; wells were sampled eight times per year under the compliance program. Sampling will be coordinated with the IRM and operable unit-monitoring programs.

4.1 Objectives of RCRA Monitoring

Three stages of monitoring with three separate objectives are defined in WAC 173-303-645. Detection monitoring, outlined in WAC 173-303-645 (9), is designed to determine whether a RCRA unit has adversely affected groundwater quality (i.e., whether a leak has occurred). This is accomplished by comparing downgradient concentrations of site-specific parameters to values indicative of background concentrations. If a statistically significant increase (or pH decrease) over background occurs in any downgradient well, compliance monitoring is initiated. In compliance monitoring, downgradient groundwater concentrations of constituents of concern are compared to the concentration limits set in the facility's permit and monitoring plan. Concentration limits may be those specified in WAC 173-303-645 (5) (a) or alternative limits set by Ecology. If the concentration limits are exceeded, the site enters a corrective action program.

The 183-H basins have contaminated groundwater with chromium, nitrate, technetium-99, and uranium at concentrations that are greater than concentration limits defined by Hartman and

Chou (1995). Thus, a corrective action is required by RCRA and is deferred to groundwater cleanup under the 100-HR-3 Groundwater Operable Unit. RCRA monitoring during the IRM is intended to determine whether concentrations of the contaminants of concern are decreasing. If concentrations do not decrease significantly, the IRM design will be reevaluated.

4.2 Dangerous Waste Constituents

Chromium, nitrate, technetium-99, and uranium are the contaminants of concern for the 183-H basins (Hartman and Chou 1995). As discussed in Section 3.3, the basins have contributed chromium, nitrate, sulfate, sodium, technetium-99, and uranium to the groundwater. Of these, only chromium[a] and nitrate are dangerous waste constituents. The radioactive portion of mixed waste is interpreted by DOE to be regulated under the *Atomic Energy Act of 1954*; the nonradioactive dangerous portion of mixed waste is interpreted to be regulated under RCRA and WAC 173-303. It is the position of DOE that any procedures, methods, data, or information associated with this monitoring program that relate solely to the radioactive constituent of mixed wastes is outside the scope of the Hanford Facility RCRA Permit but are included for the sake of completeness. It is the position of Ecology that the radioactive portion influences safe storage of the waste and, therefore, information about radioactive constituents is necessary to ensure compliance with WAC 173-303 and the RCRA permit. Both agencies acknowledge the other's position, but to avoid a conflict on the issue, DOE has agreed to provide information on radioactive constituents without agreeing with Ecology's position and Ecology has agreed to accept the information in this context without giving up its position.

The following factors were considered by Hartman and Chou (1995) in deriving a constituent list for the 183-H basins: process knowledge, history of detection in site groundwater, and other sources of contamination in the area. A database of groundwater chemistry data was queried for candidate constituents for upgradient wells 199-H3-2A and 199-H4-6 and downgradient wells 199-H4-3, 199-H4-4, 199-H4-9, 199-H4-12A, and 199-H4-18. These wells were chosen to represent conditions upgradient of the basins and in the most contaminated zone downgradient of the basins.

The maximum concentration limits (MCLs) for 14 constituents are defined in Table 1 of WAC 173-303-645. Groundwater data for 183-H wells were compared to those limits (Table 3). Chromium was the only constituent that significantly exceeded the limit. Chromium concentrations exceeded the MCL in upgradient and downgradient wells. One value of silver in an upgradient well exceeded the MCL but it was orders of magnitude greater than the rest of the data from the same well and is a suspected error.

(a) Hexavalent chromium is a dangerous waste constituent. Dissolved chromium in groundwater is assumed to be hexavalent chromium, the most soluble species.

Table 3. Groundwater Quality Compared to Drinking Water Standards

Constituent	Standard[a]	Limit	Exceed	Concentration Range[b] (μg/L) and Comments
WAC 173-303-645, Table 1				
Arsenic	-645	50 μg/L	No	All data <5 - 15 (filtered) <5 - 13 (unfiltered)
Barium	-645	1,000 μg/L	No	<20 - 110 (filtered) <20 - 190 (unfiltered)
Cadmium	-645	10 μg/L	No	<2 (filtered) <2 (unfiltered)
Chromium	-645	50 μg/L	Yes	16 - 300 (filtered) <20 - 1300 (unfiltered)
Lead	-645	50 μg/L	No	All data after 1985 <5 - 7.3 (filtered) <5 - 11.2 (unfiltered)
Mercury	-645	2 μg/L	No	All data after 1985 <0.1 (filtered) <0.1 (unfiltered)
Selenium	-645	10 μg/L	No	All data <5 (filtered) <5 - 7 (unfiltered)
Silver	-645	50 μg/L	Yes[c]	<20 (filtered) <20 (unfiltered, excluding outlier)
Endrin	-645	0.2 μg/L	Yes[d]	All data <1
Lindane[e]	-645	4 μg/L	No	All data <1
Methoxychlor	-645	100 μg/L	No	All data <3
Toxaphene	-645	5 μg/L	No	All data <1
2,4-D	-645	100 μg/L	No	All data <2
2,4,5-TP silvex	-645	10 μg/L	No	All data <2
U.S. Environmental Protection Agency Primary and Secondary Standards[f]				
1,1,1-Trichloroethane	Final MCL (EPA 1996)	200 μg/L	No	<200, except one value flagged for blank contamination
Tetrachloro-ethylene	Final MCL (EPA 1996)	5 μg/L	Yes[d]	All data <10 detections rare and sporadic
Methylene chloride[g]	Final MCL (EPA 1996)	5 μg/L	No	<5, except one value flagged for blank contamination

Table 3. (contd)

Constituent	Standard[a]	Limit	Exceed	Concentration Range[b] (μg/L) and Comments
Antimony	Final MCL (EPA 1996)	6 μg/L	Yes	<26 - 47 (filtered) <26 - 100 (unfiltered)
Aluminum	Final SMCL (EPA 1996)	50 to 200 μg/L	Yes	<19 - 82 (filtered) <19 - 2,800 (unfiltered)
Iron	Final SMCL (EPA 1996)	300 μg/L	Yes	All but 3 filtered samples <300 <5 - 1,700 (filtered) <20 - 5,800 (unfiltered)
Manganese	Final SMCL (EPA 1996)	50 μg/L	Yes	All but 2 filtered samples <50 <0.72 - 55 (filtered) <0.72 - 2,100 (unfiltered)
Nickel	Final MCL (EPA 1996)	100 μg/L	Yes	All but 1 filtered sample <100 <13 - 180 (filtered) <13 - 580 (unfiltered)
Uranium	EPA Proposed 1991 (EPA 1996)	20 μg/L	Yes	<0.3 - 534
Technetium-99	NIPDWR	900 pCi/L	Yes	0 - 2,750 pCi/L
Gross alpha	NPDWR 1991 40 CFR 141	15 pCi/L	Yes	<0.41 - 4,700 pCi/L
Gross beta	NPDWR 1991 40 CFR 141	50 pCi/L	Yes	<1.66 - 820 pCi/L

(a) Abbreviations for standards:
-645 μg/L WAC 173-303-645, Table 1 (maximum concentration limits).
CFR Code of Federal Regulations.
MCL Maximum contaminant level.
NIPDWR National interim primary drinking water regulation.
NPDWR National primary drinking water regulation.
SMCL Secondary maximum contaminant level.

(b) Range in wells 199-H3-2A, 199-H4-3, 199-H4-4, 199-H4-6, 199-H4-9, and 199-H4-18; from samples analyzed by DataChem Laboratories (after December 31, 1991), except where few or no data were available after that date, all data used as noted.

(c) One value exceeded the standard, but data review has been requested because result was unrealistically large.

(d) Samples had no detectable concentration of the constituent; exceedance caused by detection limits larger than standards.

(e) Lindane also known as gamma-BHC.

(f) Selected constituents for which there was at least 1 exceedance or for constituents where detection limit is greater than the MCL; at least 1 detection.

(g) Methylene chloride also known as dichloromethane.

Groundwater data for the 183-H basins were also compared to EPA current and proposed drinking water standards, as compiled by Buonicore (1995), and limits for gross alpha, gross beta, technetium-99, and uranium. (Appendix B contains a complete list of standards used.) Significant exceedances (see Table 3) were observed for gross alpha, gross beta, nitrate, technetium-99, and uranium. Standards were also exceeded for aluminum, antimony, iron, manganese, and nickel, but virtually only in unfiltered samples. These samples contained particulate matter believed to be derived from well screens and/or aquifer sediments. Filtered samples are believed to be more representative of groundwater quality. Exceedances could not be determined for some additional constituents that have detection limits greater than the drinking water standards. If the constituent was never detected, it does not appear in Table 3. Tetrachloroethylene has been detected sporadically, but is not believed to be significant. Gross alpha activity in 183-H groundwater comes from uranium. Gross beta activity in 183-H groundwater results from contamination with technetium-99.

The constituent list proposed in this monitoring plan includes fluoride, which was not identified as a groundwater contaminant of concern by Hartman and Chou (1995). Fluoride is present in the vadose zone beneath the former basins (see Section 2.2), and is currently below regulatory standards in groundwater downgradient of the former basins. However, fluoride concentrations downgradient of the basins are higher than upgradient. For example, fluoride in well 199-H4-3 averaged 983 µg/L between 1992 and 1996. The average concentration in upgradient well 199-H4-6 during the same period was 444 µg/L. Groundwater will continue to be analyzed for this constituent to determine whether fluoride continues to be elevated in downgradient wells.

4.3 Concentration Limits

Hartman and Chou (1995) identified the following concentration limits for the constituents of concern at the 183-H basins:

- chromium: 122 µg/L, based on background concentrations from upgradient wells 199-H3-2A and 199-H4-6
- nitrate: 45,000 µg/L (as NO_3), based on final MCL (EPA 1996)
- uranium: 20 µg/L, based on EPA proposed MCL (EPA 1996) (this value is proposed for the 183-H basins until the rule containing the subject standard is promulgated)
- technetium-99: 900 pCi/L, based on national primary drinking water standards (40 CFR 141).

These concentration limits were applied during compliance monitoring to determine whether corrective action was necessary as required under WAC 173-303-645. No formal comparison of contaminant concentrations to these limits will be made during the IRM. After completion of the IRM and future phases of corrective action, the RCRA monitoring program will be revised and contaminant concentrations will be compared to these or alternative limits to determine whether the corrective action was successful.

4.4 Point of Compliance

The point of compliance is defined in WAC 173-303-645 (6) as "...a vertical surface located at the hydraulically downgradient limit of the waste management area that extends down into the uppermost aquifer underlying the regulated units." This is the location in the uppermost aquifer where groundwater monitoring takes place and the groundwater protection standard applies. Six monitoring wells located downgradient of the 183-H basins in the contaminant plume represented the point of compliance for the compliance program.

The point of compliance is not applicable during the first phase of corrective action. After the IRM and future phases of corrective action are complete, the point of compliance will be redefined if necessary to account for changes in groundwater-flow directions. Subsequent monitoring programs will be developed to determine whether the concentrations of contaminants of concern have decreased below the concentration limits defined in Section 4.3 and whether they remain there for a period of 3 consecutive years.

4.5 Compliance Period

The compliance period is the number of years equal to the active life of the unit, any waste management activity before permitting, and the closure period. Typically, groundwater monitoring is required for 30 years following completion of closure activities, though this period may be shortened or extended by the regulatory authority. If the site undergoes corrective action, the compliance period will be extended until it can be demonstrated that the applicable limit has not been exceeded for 3 consecutive years.

4.6 Groundwater Monitoring Wells

Four wells located in the 183-H chromium plume will be monitored for RCRA requirements during pump-and-treat activities (Table 4). No upgradient wells will be monitored for RCRA while the 183-H IRM is active. Monitoring upgradient wells does not contribute to the primary objective of RCRA monitoring, which is to track concentration trends in the contaminant plume. Upgradient wells will be monitored under CERCLA. Three of the wells are completed at the top of the uppermost aquifer: wells 199-H4-7 and 199-H4-12A are extraction wells and well 199-H4-3 is a monitoring well that has historically shown the highest levels of contamination from the 183-H basins. Modeling of the capture zone for the planned IRM indicates these 3 wells will monitor water that flows directly beneath the 183-H basins.

Table 4. Proposed Final-Status Monitoring Network During Chromium Interim Remedial Action

Well	Lambert Coordinates (m)		Top of Casing (m [ft])		Surface Elevation[a] (m [ft]) NGVD29
	East	North	NAD88	NGVD29	
199-H4-3	577,940.49	152,858.54	129.299 (424.21)	128.268 (420.83)	127.460 (417.18)
199-H4-7	577,804.13	152,890.85	129.38 (424.48)	128.35 (421.09)	127.72 (419.04)
199-H4-12A	578,009.15	152,912.73	127.216 (417.38)	126.185 (413.99)	125.439 (411.55)
199-H4-12C	578,011.77	152,919.81	127.23 (417.41)	126.20 (414.03)	125.33 (411.19)

Well	Drill Date	Construction (m [ft])			Average Water Level, 1994 (m [ft])	Thickness of Screened Aquifer[e] (m [ft])	Unit Monitored
		Type[b]	Screen Depth[c]	Screen Elevation[d]			
199-H4-3	5/74	A	10.4 to 16.8 (34 to 55)	117.1 to 110.7 (383 to 362)	113.95 (373.86)	3.3 (12)	Hanford unconfined
199-H4-7	9/86	B	11.6 to 16.2 (38 to 53)	116.1 to 111.6 (381 to 366)	114.13 (374.45)	2.4 (8)	Hanford unconfined
199-H4-12A	11/86	B	10.1 to 14.6 (33 to 48)	115.3 to 110.8 (379 to 364)	113.85 (373.53)	3.1 (10)	Hanford unconfined
199-H4-12C	11/86	B	21.9 to 25.0 (72 to 82)	103.3 to 100.3 (339 to 329)	113.78 (373.28)	3.0 (10)	Ringold (semiconfined)

Coordinates and elevations from U.S. Army Corps of Engineers survey in 1993.
NAD88 = North American Datum of 1988. NGVD29 = National Geodetic Vertical Datum of 1929.
(a) Brass cap in concrete pad.
(b) Well casing and screen:
A = Perforated, 8-in.-dia. carbon steel casing. No documented annular seal or sand pack. Concrete pad at surface (depth not documented).
B = 6-in.-dia. stainless steel casing with threaded screen. Annular seal from above screen to surface.
(c) Screen depths are from ground surface as noted in geologist's logs.
(d) Surface elevation minus screen depth.
(e) For water-table wells, average water level minus elevation of bottom of screen. For well 199-H4-12C, screened thickness.

Well 199-H4-12C is located adjacent to well 199-H4-12A and is completed in a silty unit of the Ringold Formation. As discussed in Section 3.3, this well consistently has elevated concentrations of chromium, though the contaminant source is unknown. This well will be monitored to ascertain whether pumping the shallow aquifer affects chromium concentrations deeper in the Ringold sediments.

Well 199-H4-3 does not meet the requirements of WAC 173-160 for resource protection wells because it is constructed of perforated (not screened) carbon steel casing. No documentation exists that shows an annular seal being installed when the well was constructed, but it is known that a surface seal was added later. Well 199-H4-3 has consistently shown the highest levels of nitrate, technetium-99, and uranium contamination, and its inclusion in the network adds conservatism and ensures historical continuity of data. Wells 199-H4-7, 199-H4-12A, and 199-H4-12C are constructed of stainless steel casing with threaded, stainless steel screens and are compliant with WAC 173-160. The wells have sand packs around the screens with annular seals from the sand pack to the surface. As-built diagrams for all four wells are provided in Appendix C.

4.7 Groundwater Sampling and Analysis

This section describes the sampling and analysis program for the 183-H basins, including monitoring parameters, monitoring frequency, sampling protocols, and analytical methods.

4.7.1 Monitoring Parameters

Table 5 lists the constituents to be analyzed for the 183-H basins. The list includes the following:

- constituents of concern identified in Section 4.2
- additional constituents to aid data interpretation (alkalinity, anions, and inductively coupled plasma metals)
- field parameters routinely acquired at the wellhead (pH, specific conductance, turbidity, and temperature).

Table 5. List of Constituents

Dangerous Waste Constituents	Field Parameters	Other
Chromium (filtered) Fluoride Nitrate Technetium-99 Uranium	pH Specific conductance Temperature Turbidity	Alkalinity Anions Metals (filtered) by inductively coupled plasma method

4.7.2 Sampling Frequency

The wells in the RCRA monitoring network will be sampled at least annually during the active life of the IRM. This frequency is judged to be adequate to monitor contaminant trends. Monitoring for CERCLA requirements will measure chromium in certain wells more frequently (DOE 1996c).

4.7.3 Sampling Procedures

Groundwater-sampling procedures, sample collection documentation, and chain-of-custody requirements are described in the *Environmental Investigations and Site Characterization Manual* (WHC 1989) and in the *Quality Assurance Project Plan for RCRA Groundwater Monitoring Activities* (WHC 1995) or in equivalent PNNL documents. Work by subcontractors is conducted to their equivalent approved standard operating procedures.

All field sampling activities are recorded in the proper field logbook as specified in WHC (1989, Section 1.5) or equivalent PNNL documents. Wells 199-H3-12A and 199-H4-7 are extraction wells for the IRM. Groundwater is collected through a sampling port. Before sampling the other wells, the static water level is measured and recorded as specified in WHC (1989, Section 10.2). Based on the measured water level and well construction details, the volume of water in the well is calculated and documented on the well sampling form or field notebook. Each well is purged until the approval criteria are met, as specified in WHC (1989, Section 5.8). Purge water is managed according to WHC (1989, Section 10.3). If a well pumps dry because of very slow recharge or low water levels, samples are collected after recharge.

Quality assurance requirements are defined in the *Westinghouse Hanford Company Quality Assurance Manual* (WHC 1988) or in equivalent PNNL documents and Article 31 of Ecology et al. (1989). The RCRA sampling and analysis program is supported by WHC (1995) or equivalent PNNL documents. Sample preservation and chain-of-custody procedures are discussed in WHC (1989, Section 5.1).

4.7.4 Analytical Procedures

Procedures for field measurements (e.g., pH, specific conductance, temperature, and turbidity) are specified in the user's manuals for the meters used. Laboratory analytical procedures are specified in WHC (1995). Most of the analytical methods are selected from those provided in *Test Methods for Evaluating Solid Wastes, Physical/Chemical Methods* (EPA 1990). For constituents with no analytical method specified by EPA (1990), other methods are selected as specified by WHC (1995).

4.7.5 Determining Direction of Groundwater Flow

An understanding of groundwater-flow directions is essential to evaluating the performance of the pump-and-treat system. Thus, a network of pressure transducers was placed in wells that are expected to be influenced by the system. Measurements are recorded hourly by electronic data loggers. Manual measurements are collected monthly to calibrate the transducers. Water levels are also measured manually in wells across the entire 100-H Area quarterly and before any well is sampled (except extraction wells). The procedure for measuring water levels is included in WHC (1989, Section 10.2). If the water-table elevations indicate that the IRM is not performing as expected, or the monitoring wells are not adequately monitoring the basins, the IRM will be reevaluated or the monitoring network changed.

5.0 Data Management and Reporting

5.1 Data Evaluation

Groundwater chemistry and water-level data are evaluated for precision, accuracy, representativeness, and completeness according to WHC (1992, Section 2.6) or an equivalent PNNL procedure. Data are flagged if associated with suspect quality control data. Data are also screened for completeness and representativeness by a project scientist assigned to the 183-H basins (e.g., data are compared to historical and spatial trends). Suspect data are investigated through the Request for Data Review process and are flagged in the database.

5.2 Data Storage

Data are submitted by the analytical laboratory in electronic form and are loaded into the Hanford Environmental Information System (HEIS) database. Parameters measured in the field are either entered into HEIS manually or through the electronic Field Sampling Information System. Record copies of field and laboratory data are stored at PNNL. Data from the HEIS database may be downloaded to a smaller database, such as the Geosciences Data Analysis Toolkit (GeoDAT), for data evaluation and trend analysis.

5.3 Reporting

Chemistry and water-level data from RCRA groundwater monitoring are reviewed quarterly and are publicly available in HEIS. Interpretive reports are issued annually in March (e.g., Hartman and Dresel 1997).

6.0 References

40 CFR 141, Code of Federal Regulations, Title 40, Part 141. *National Primary Drinking Water Standards.*

40 CFR 265, Code of Federal Regulations, Title 40, Part 265. *Interim Status Standards for Owners and Operators of Hazardous Water Treatment, Storage, and Disposal Facilities.*

40 CFR 268, Code of Federal Regulations, Title 40, Part 268. *Land Disposal Restrictions Program.*

RCW 70.105D, Revised Code of Washington, Title 70, Chapter 105D. *Model Toxics Control Act*, as amended.

WAC 173-160, Washington Administrative Code. *Minimum Standards for Construction and Maintenance of Wells.*

WAC 173-303, Washington Administrative Code. *Dangerous Waste Regulations.*

WAC 173-303-400, Washington Administrative Code. *Interim Status Facility Standards.*

WAC 173-303-645, Washington Administrative Code. *Releases from Regulated Units.*

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Appendix A

Proposal for Resource Conservation and Recovery Act Groundwater Monitoring at the 183-H Basins During the 100-HR-3 Interim Remedial Measure

Appendix A

Proposal for Resource Conservation and Recovery Act Groundwater Monitoring at the 183-H Basins During the 100-HR-3 Interim Remedial Measure

A series of data quality objectives workshops was held in early 1997 to develop a groundwater monitoring program for the 100-HR-3 Groundwater Operable Unit. A follow-up meeting was held on March 5, 1997, between the U.S. Department of Energy (DOE), State of Washington Department of Ecology (Ecology), Pacific Northwest National Laboratory, and the Environmental Restoration Contractor. A tentative monitoring program was proposed at that meeting, including a well list, list of constituents to be analyzed for, and sampling frequency. Ecology instructed DOE to propose the program formally in a letter, which was transmitted March 14, 1997. A copy of that letter is included in this appendix.

U.S. Department of Energy
Richland Operations Office
P.O. Box 550
Richland, Washington 99352

NMWMP - Hanford

MAR 18 1997

Kennewick

045514

MAR 14 1997

Mr. Steve M. Alexander
Perimeter Areas Section Manager
Nuclear Waste Program
State of Washington
Department of Ecology
1315 W. Fourth Avenue
Kennewick, Washington 99336-6018

Dear Mr. Alexander:

PROPOSAL FOR RESOURCE CONSERVATION AND RECOVERY ACT (RCRA) GROUNDWATER MONITORING AT THE 183-H BASINS DURING THE 100-HR-3 INTERIM REMEDIAL MEASURE (IRM)

In following up on the commitments made on March 5, 1997, same subject as above, this is to present, as a proposal, the conditions that were developed during that meeting.

The main points addressed below are: 1) monitoring objective, 2) monitoring network, 3) constituents, 4) sampling frequency, and 5) water level measurements. Upon the State of Washington Department of Ecology's (Ecology) agreement with this proposal, a revised RCRA monitoring plan will be prepared.

- MONITORING OBJECTIVE: During the 100-HR-3 IRM, the objective of the RCRA-compliant monitoring is to evaluate general trends in concentrations of 183-H contaminants of concern (chromium, nitrate, uranium, technetium-99) downgradient of the facility.

- MONITORING WELLS:

  Upgradient: None

  Downgradient: 199-H4-3
  199-H4-7
  199-H4-12A
  199-H4-12C

  Justification: Upgradient monitoring does not contribute to the monitoring objective stated above. These three downgradient wells are predicted to be directly downgradient of the basins after pumping begins, according to the capture zone model. Wells H4-7 and H4-12A are extraction wells. Well H4-3 typically contains the highest concentrations of 183-H contaminants of any shallow well. All three wells have a long historic record.

- CONSTITUENTS:

Constituents of concern: chromium (filtered), nitrate, technetium-99, chemical uranium

Supporting data: Inductively Coupled Plasma (ICP) metals (filtered), anions, alkalinity

Justification: The four constituents of concern were identified in the final-status RCRA monitoring plan based on their presence in the waste stream and their presence in groundwater at levels above maximum contaminant levels or drinking water standards. All four were above their respective concentration limits after final-status monitoring began, thereby triggering the site into a corrective action phase under RCRA (RL ltr. to S. M. Alexander from M. J. Furman "Exceedance of Concentration Limits in Groundwater at 183-H Solar Evaporation Basins," dtd. September 27, 1996). ICP metals, anions, and alkalinity are useful to evaluate general groundwater chemistry and data quality. Note that chromium is an ICP metal and nitrate is an anion, so these data will be received at no added cost.

- SAMPLING FREQUENCY: Annual

Justification: Annual sampling is sufficient to illustrate general trends in concentrations. Four independent samples from each well, as required under final-status compliance monitoring, are not necessary during corrective action; obtaining independent samples would not aid in meeting the above stated monitoring objective.

- WATER LEVEL MEASUREMENTS:

The purpose of water-level monitoring is to evaluate flow patterns during the IRM. Bechtel Hanford, Inc. currently maintains a transducer network in wells that are expected to be affected by groundwater extraction under the IRM. Monthly field measurements are conducted in these wells to calibrate the transducers. Additional field measurements are made twice each year over the entire 100-H Area. These data will be sufficient to evaluate flow patterns to fulfill the RCRA objective.

The conditions addressed above result in a modification to the current RCRA-compliant monitoring network by reducing the number of monitoring wells from eight to four, reducing the number of analytes measured, and the sampling frequency. As reflected in the discussions of March 5, 1997, the modified monitoring network is a melding of the RCRA-compliant and the IRM monitoring networks. This modification provides a technically and regulatively defensible, and cost effective monitoring network within the context of the Interim Remedial Action for groundwater contamination that will be conducted in the proximity of the 183-H facility.

Ecology's prompt concurrence on these changes would be appreciated. The modified monitoring schedule and analyte list will be implemented on the first scheduled monitoring event, per the revised RCRA monitoring plan, following the start of the IRM pumping operations. If you want to discuss this matter further or require additional information, please contact me at 373-9630.

Sincerely,

Marvin J. Furman, Project Manager
Groundwater Project

GWP:MJF

cc: S. Leja, Ecology
W. Soper, Ecology

Concurrence: State of Washington Department of Ecology   4-22-97 Date

Appendix B

Drinking Water Standards

Appendix B

Drinking Water Standards

Groundwater chemistry data for the 183-H Solar Evaporation Basins were compared to drinking water standards, including those listed in Buonicore (1995) and Washington Administrative Code 173-303-645 (Table 1), plus radionuclides. Where more than one standard applied for a given constituent, the more stringent one is listed.

See the body of the report for more information on the Washington Administrative Code constituents and all other constituents for which at least one detected value exceeded the standard.

Constituent (standard, µg/L)

1,1,1-Trichloroethane (200)
1,1,2-Trichloroethane (5)
1,2-Dibromo-3-chloropropane (0.2)
1,2-Dibromoethane (0.05)
1,2-Dichlorobenzene (600)
1,2-Dichloroethane (5)
1,2-Dichloropropane (5)
1,2,4-Trichlorobenzene (70)
1,4-Dichlorobenzene (75)
2(2,4,5-Trichlorophenoxy)propionic acid (50)
2,3,7,8-Tetrachlorodibenzodioxin (0.00003)
2,4,5-TP Silvex (10)
2,4-D (70)
Acrylamide (none)
Aluminum (50 to 200)
Antimony (6)
Arsenic (50)
Barium (1,000)
Benzene (5)
Benzo[a]pyrene (0.2)
Beryllium (4)
Bis(2-ethylhexyl)adipate (400)
Cadmium (5)
Carbon tetrachloride (5)
Chlordane (2)
Chloride (250,000)
Chlorobenzene (100)

Constituent (standard, µg/L unless otherwise noted)

Ethylbenzene (70)
Fluoride (4,000)
Gross alpha (15 pCi/L)
Gross beta (50 pCi/L)
Heptachlor (0.04)
Heptachlor epoxide (0.02)
Hexachlorobenzene (1)
Hexachlorocyclopentadiene (50)
Iron (300)
Lead (15)
Lindane (0.2)
Manganese (50)
Mercury (2)
Methoxychlor (40)
Nickel (100)
Nitrate (45,000 as NO_3)
Nitrite (3,300 as NO_2)
Pentachlorophenol (1)
Selenium (10)
Silver (50)
Styrene (100)
Sulfate (250,000)
Technetium-99 (900 pCi/L)
Tetrachloroethylene (5)
Thallium (2)
Toluene (1,000)
Total dissolved solids (500,000)

Chromium (100)
cis-1,2-Dichloroethylene (70)
Copper (none)
Cyanide (200)
Dichloromethane (5)
Dinoseb (7)
Endrin (0.2)
Epichlorohydrin (none)
Toxaphene (3)
trans-1,2-Dichloroethylene (100)
Trichloroethylene (5)
Uranium (20 mg/L)
Vinyl chloride (2)
Vinylidene chloride (7)
Xylenes (mixed isomers) (10,000)
Zinc (5,000)

References

Buonicore, A. J., ed. 1995. *Cleanup Criteria for Contaminated Soil and Groundwater*. ASTM Data Series DS64, Philadelphia.

WAC 173-303-645. Washington Administrative Code. *Releases from Regulated Units*. Olympia, Washington.

Appendix C

As-Built Diagrams for 183-H Solar Evaporation Basins Corrective Action Monitoring Wells

Appendix C

As-Built Diagrams for 183-H Solar Evaporation Basins Corrective Action Monitoring Wells

The as-built diagrams and construction information are presented for wells 199-H4-3, 199-H4-7, 199-H4-12A, and 199-H4-12C.

WELL CONSTRUCTION AND COMPLETION SUMMARY

Drilling Method: Cable tool

Drilling Fluid Used: Not documented

Driller's Name: H. Baker

Drilling Company: Not documented

Date Started: 17May74

Sample Method: Hard tool (nom)

Additives Used: Not documented

WA State Lic Nr: Not documented

Company Location: ____

Date Complete: Not documented

WELL NUMBER: 199-H4-3 A4629 TEMPORARY WELL NO: ____

Hanford Coordinates: N/S N 96,372.3 E/W W 39,079.7

State NAD83 N 152,858.54m E 572,940.49m

Coordinates: N 501,573 E 2,255,998

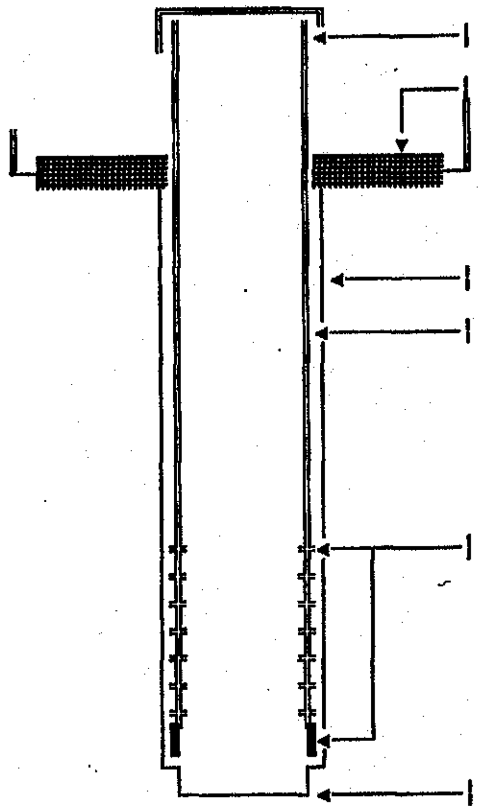
Start Card #: Not documented T____ R____ S____

Elevation Ground surface: 417.6-ft Estimated

Depth to water: 39.0-ft May74
(Ground surface) 44.7-ft 12Sep94

GENERALIZED STRATIGRAPHY — Driller's Log

0↔5: Not documented
5↔20: GRAVEL with SAND
20↔43: SAND with GRAVEL
43↔45: BOULDER
45↔50: SAND, GRAVEL & COBBLES
50↔55: Ringold Fm.
55 : Ringold Fm. and CALICHE



Elevation of reference point: [420.29-ft]
(top of casing)

Height of reference point above ground surface [2.7-ft]

Depth of surface seal [ND]
No surface seal documented, has 4-ft x 4-ft concrete pad

7-in nominal hole, 0↔55-ft

6-in ID carbon steel casing, +2.7↔55-ft

6-in casing perforations, 34↔55-ft, 4 cuts/rd/ft

Borehole drilled depth: [~57.7-ft]

SUMMARY OF CONSTRUCTION DATA AND FIELD OBSERVATIONS
RESOURCE PROTECTION WELL - 199-H4-3

WELL DESIGNATION	:	199-H4-3
CERCLA UNIT	:	100-Aggregate Area
RCRA FACILITY	:	183-H Solar Evaporation Basins
HANFORD COORDINATES	:	N 96,372.3 W 39,079.7 [29Aug86-100H]
LAMBERT COORDINATES	:	N 501,574 E 2,255,998 [HANCONV] N 152,858.54m E 572,940.49m [ACOE-NAD83]
DATE DRILLED	:	May74
DEPTH DRILLED (GS)	:	55.0-ft
MEASURED DEPTH (GS)	:	57.7-ft, 29Apr92
DEPTH TO WATER (GS)	:	39.0-ft, May74; 44.7-ft, 12Sep94
CASING DIAMETER	:	6-in ID carbon steel, +2.7↔55.0-ft
ELEV TOP CASING	:	420.29-ft, [29Aug86-100H]
ELEV GROUND SURFACE	:	417.7-ft, Estimated
PERFORATED INTERVAL	:	34↔55-ft
SCREENED INTERVAL	:	Not Applicable
COMMENTS	:	FIELD INSPECTION, 12Jun90; Carbon steel casing. 4-ft by 4-ft concrete pad, 4 posts, 1 removable. Capped and locked, brass cap in pad with well ID. Not in radiation zone.
AVAILABLE LOGS	:	Driller
TV SCAN COMMENTS	:	21Apr92 - Well needs cleaning. 29Apr92 - Casing ends @ 55.1-ft, open hole 55.1↔57.7-ft., sandy bottom. Perfs start @ 32.8-ft, 4 cuts/rd/ft.
DATE EVALUATED	:	Not Applicable
EVAL RECOMMENDATION	:	Not Applicable
LISTED USE	:	100H monthly w/1 measurement, 19Jun85↔12Sep94;
CURRENT USER	:	BHI ER w/1 monitoring WHC ES&M RCRA sampling, PNL sitewide sampling
PUMP TYPE	:	Hydrostar
MAINTENANCE	:	Maintenance activities documented in the Hanford Wells Database System

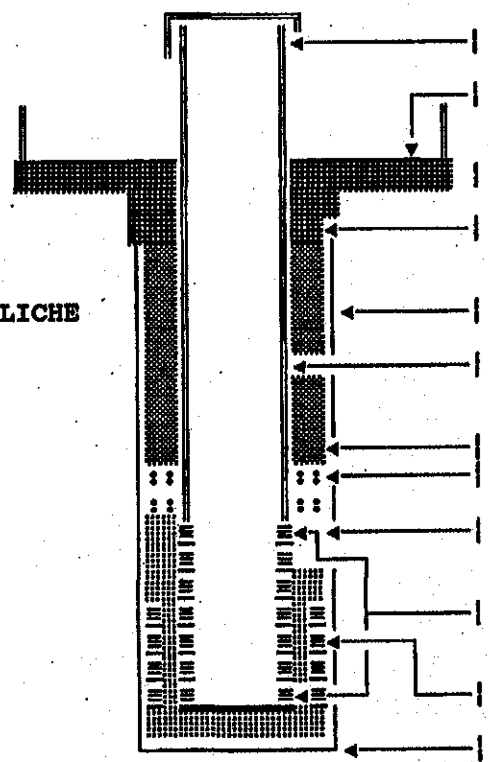
WELL CONSTRUCTION AND COMPLETION SUMMARY

Drilling Method: Cable tool	Sample Method: Drive barrel	WELL NUMBER: 199-H4-7 A4638 TEMPORARY WELL NO: 1H-TW1
Drilling Fluid Used: Water	Additives Used: Not documented	Hanford Coordinates: N/S N 96,479 E/W W 39,527
Driller's Name: D. Garcia	WA State Lic Nr: 1143	State NAD83 N 152,890.85m E 577,804.13m Coordinates: N 501,679 E 2,255,550
Drilling Company: Onwego Drilling	Company Location: Kennewick, WA	Start Card #: Not documented T____ R____ S______
Date Started: 02Sep86	Date Complete: 22Sep86	Elevation Ground surface: 418.5-ft Estimated

Depth to water: 43.0-ft Sep86
(Ground surface) 44.5-ft 12Sep94

GENERALIZED Geologist's
STRATIGRAPHY Log

0↔3: Backfill
3↔14: Sandy GRAVEL
14↔24: Sandy GRAVEL with SILT
24↔54: Sandy GRAVEL
54↔55: Silty SAND with CLAY & CALICHE
Ringold Fm.



Elevation of reference point: [420.59-ft]
(top of casing)
Height of reference point above [2.1-ft]
ground surface

Depth of surface seal [0↔4.0-ft]
Type of surface seal,
4-ft by 4-ft concrete pad
extending 4-ft into annulus

11-in nominal hole, 0↔55-ft

6-in ID stainless steel casing,
+2.1↔38.0-ft

8↔20 mesh granular bentonite, 4↔25.0-ft
¼-in Volclay tablets, 25.0↔30.0-ft

10↔20 mesh silica sand, 30.0↔55.0-ft

6-in T304 stainless steel screen,
38.0↔53.0-ft, #20-slot

10-in stainless steel telescoping screen,
43.0↔53.0-ft, #40-slot

Borehole drilled depth: [55.0-ft]

SUMMARY OF CONSTRUCTION DATA AND FIELD OBSERVATIONS
RESOURCE PROTECTION WELL - 199-H4-7

WELL DESIGNATION	:	199-H4-7
CERCLA UNIT	:	100-Aggregate Area
RCRA FACILITY	:	183-H Solar Evaporation Basins
HANFORD COORDINATES	:	N 96,479 W 39,527 [30Oct86-100-H]
LAMBERT COORDINATES	:	N 501,679 E 2,255,550 [HANCONV] N 152,890.65m E 577,804.13m [ACOE-NAD83]
DATE DRILLED	:	Sep86
DEPTH DRILLED (GS)	:	55.0-ft
MEASURED DEPTH (GS)	:	Not documented
DEPTH TO WATER (GS)	:	43.0-ft, Sep86; 44.4-ft, 12Sep94
CASING DIAMETER	:	6-in ID stainless steel, +2.1↔38.0-ft
ELEV TOP CASING	:	420.59-ft, [30Oct86-100H]
ELEV GROUND SURFACE	:	418.5-ft, Estimated
PERFORATED INTERVAL	:	Not Applicable
SCREENED INTERVAL	:	6-in stainless steel, #20-slot, 38↔53-ft; 10-in telescoping screen, #40-slot, 43↔53-ft
COMMENTS	:	FIELD INSPECTION, 12Jun90; Stainless steel casing. 4-ft by 4-ft concrete pad, 4 posts, 1 removable. Capped and locked, brass cap in pad with well ID. Not in radiation zone.
AVAILABLE LOGS	:	Geologist
TV SCAN COMMENTS	:	Not Applicable
DATE EVALUATED	:	Not Applicable
EVAL RECOMMENDATION	:	Not Applicable
LISTED USE	:	100 H w/l measurement, 20Nov86↔12Sep94
CURRENT USER	:	BHI ER w/l monitoring WHC ES&M RCRA sampling, PNL sitewide sampling
PUMP TYPE	:	Hydrostar
MAINTENANCE	:	

WELL CONSTRUCTION AND COMPLETION SUMMARY

Drilling Method: Cable tool
Drilling Fluid Used: Water
Driller's Name: D. Ludtke
Drilling Company: Onwego Drilling
Date Started: 27Oct86

Sample Method: Hard tool Drive barrel
Additives Used: Not documented
WA State Lic Nr: 1333
Company Location: Kennewick, WA
Date Complete: 04Nov86

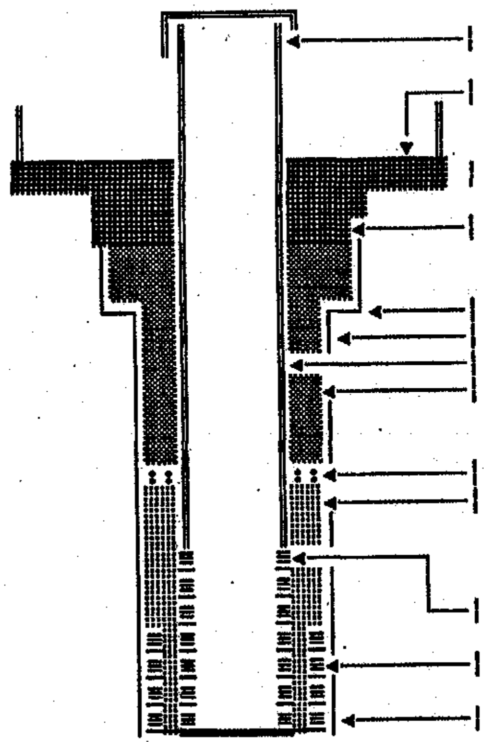
WELL NUMBER: 199-H4-12A A4616
TEMPORARY WELL NO: 1H-TC1A
Hanford Coordinates: N/S N 96,549 E/W W 38,854
State NAD83 N 152,912.73m E 528,009.15m
Coordinates: N 501,751 E 2,256,223
Start Card #: Not documented T____ R____ S____
Elevation Ground surface: 411.0-ft Estimated

Depth to water: 38.5-ft Oct86
(Ground surface) 39.3-ft 12Sep94

GENERALIZED STRATIGRAPHY

Geologist's Log

0↔5: Gravelly silty fine to very fine SAND
5↔11: Silty sandy GRAVEL
11↔34: Sandy GRAVEL
34↔35: GRAVEL with SAND
35↔40: Sandy GRAVEL
40↔45: Gravelly SAND
45↔51: Sandy GRAVEL
51↔52: Ringold, brown CLAY and CALICHE



Elevation of reference point: (top of casing) [413.50-ft]
Height of reference point above ground surface [2.5-ft]
Depth of surface seal [0↔4.5-ft]
Type of surface seal, 4-ft by 4-ft concrete surface pad extending 4.5-ft into annulus
15-in nominal hole, 0↔10-ft
11-in nominal hole, 10↔48-ft
6-in ID stainless steel casing, +2.5↔33-ft
8↔20-mesh granular bentonite, 4.5↔26-ft
¼-in Volclay tablets, 26↔28-ft
10↔20-mesh silica sand, 26↔48-ft
6-in T304 stainless steel screen, 33↔48-ft, #20-slot
10-in telescoping screen 37.5↔47.5-ft, #40-slot
Borehole drilled depth: [48.0-ft]

SUMMARY OF CONSTRUCTION DATA AND FIELD OBSERVATIONS
RESOURCE PROTECTION WELL - 199-H4-12A

WELL DESIGNATION	:	199-H4-12A
CERCLA UNIT	:	100-Aggregate Area
RCRA FACILITY	:	183-H Solar Evaporation Basins
HANFORD COORDINATES	:	N 96,549 W 38,854 [29Dec86-100H]
LAMBERT COORDINATES	:	N 501,751 E 2,256,223 [HANCONV]
		N 152,912.73m E 578,009.15m [ACOE-NAD83]
DATE DRILLED	:	Nov86
DEPTH DRILLED (GS)	:	48.0-ft
MEASURED DEPTH (GS)	:	Not documented
DEPTH TO WATER (GS)	:	38.5-ft, Oct86;
		39.3-ft, 12Sep94
CASING DIAMETER	:	6-in ID stainless steel, +2.5↔33.0-ft
ELEV TOP CASING	:	413.50-ft, [29Dec86-100H]
ELEV GROUND SURFACE	:	411.0-ft, Estimated
PERFORATED INTERVAL	:	Not Applicable
SCREENED INTERVAL	:	6-in stainless steel, #20-slot, 33↔48-ft;
		10-in telescoping, #40-slot, 37.5↔47.5-ft
COMMENTS	:	FIELD INSPECTION, 12Jun90;
		Stainless steel casing. 4-ft by 4-ft concrete pad, 4 posts, 1 removable .
		Capped and locked, brass cap in pad with well ID.
		Not in radiation zone.
AVAILABLE LOGS	:	Geologist
TV SCAN COMMENTS	:	Not Applicable
DATE EVALUATED	:	Not Applicable
EVAL RECOMMENDATION	:	Not Applicable
LISTED USE	:	100H monthly w/l measurement, 20Nov86↔12Sep94
CURRENT USER	:	BHI ER w/l monitoring
		WHC ES&M RCRA sampling,
		PNL sitewide sampling
PUMP TYPE	:	Hydrostar
MAINTENANCE	:	

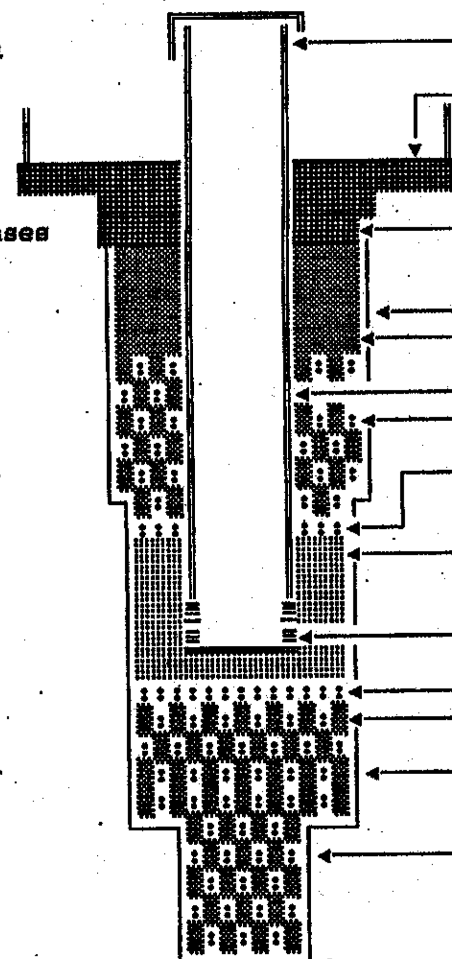
WELL CONSTRUCTION AND COMPLETION SUMMARY

Drilling Method: Cable tool	Sample Method: Drive barrel	WELL NUMBER: 199-H4-12C A4618 TEMPORARY WELL NO: 1H-TC1C
Drilling Fluid Used: Water	Additives Used: Not documented	Hanford Coordinates: N/S N 96,573 E/W W 38,845
Driller's Name: L. Bultena	WA State Lic Nr: 0066	State NAD83 N 152,919.81m E 578,011.77m Coordinates: N 501,775 E 2,256,232
Drilling Company: Onwego Drilling	Company Location: Kennewick, WA	Start Card #: Not documented T____ R____ S____
Date Started: 12Aug86	Date Complete: 03Oct86	Elevation Ground surface: 410.6-ft Estimated

Depth to water: 38.2-ft Oct86
(Ground surface) 39.2-ft 12Sep94

GENERALIZED Geologist's
STRATIGRAPHY Log

0↔5: Sandy GRAVEL
5↔10: Sandy GRAVEL with SILT lenses
10↔49: Sandy GRAVEL
49↔54: Silty, sandy GRAVEL
54↔59: Silty GRAVEL
59↔74: Gravelly SILT
74↔79: Gravelly, clayey SILT
79↔84: Gravelly SILT
84↔92: Silty SAND
92↔99: Silty SAND with CALICHE
99↔175: Silty SAND with CLAY and CALICHE
175↔179: Clayey SAND
179↔194: Clayey SILT
194↔209: Sandy SILT with CLAY
209↔219: Silty SAND with CLAY
219↔220: Silty SAND



Elevation of reference point: (top of casing) [413.52-ft]
Height of reference point above ground surface [2.9-ft]
Depth of surface seal [0↔5.0-ft]
Type of surface seal, 4-ft by 4-ft concrete pad extends 5-ft into annulus
13-in nominal hole, 0↔60-ft
Granular bentonite, 5↔28.5-ft
6-in ID T304 stainless steel casing, +2.9↔72-ft
Bentonite slurry, 28.5↔61-ft
Volclay pellets, 61↔62-ft
10↔20/20↔30/20↔40-mesh silica sand, 62↔87-ft
6-in T304 stainless steel screen, 72↔82-ft, #10-slot
Bentonite pellets, 87.0↔92.0-ft
Bentonite slurry, 92.0↔220.0-ft
11-in nominal hole, 60↔174-ft
6-in nominal hole, 174↔220-ft
NOTE: Hole was drilled open hole below 174-ft
Borehole drilled depth: [220.0-ft]

SUMMARY OF CONSTRUCTION DATA AND FIELD OBSERVATIONS
RESOURCE PROTECTION WELL - 199-H4-12C

WELL DESIGNATION	:	199-H4-12C
CERCLA UNIT	:	100-Aggregate Area
RCRA FACILITY	:	183-H Solar Evaporation Basins
HANFORD COORDINATES	:	N 96,573 W 38,845 [30Oct56-100H]
LAMBERT COORDINATES	:	N 501,775 E 2,256,232 [HANCONV] N 152,919.81m E 578,011.77m [ACOE-NAD83]
DATE DRILLED	:	Oct86
DEPTH DRILLED (GS)	:	220.0-ft
MEASURED DEPTH (GS)	:	Not documented
DEPTH TO WATER (GS)	:	38.2-ft, Oct86; 39.2-ft, 12Sep94
CASING DIAMETER	:	6-in ID stainless steel, +2.9↔72.0-ft
ELEV TOP CASING	:	413.52-ft, [30Oct86-100H]
ELEV GROUND SURFACE	:	410.6-ft, Estimated
PERFORATED INTERVAL	:	Not Applicable
SCREENED INTERVAL	:	6-in stainless steel, #20-slot, 72↔82-ft;
COMMENTS	:	FIELD INSPECTION, 12Jun90; Stainless steel casing. 4-ft by 4-ft concrete pad, 4 posts, 1 removable. Capped and locked, brass cap in pad with well ID. Not in radiation zone.
AVAILABLE LOGS	:	Geologist
TV SCAN COMMENTS	:	Not Applicable
DATE EVALUATED	:	Not Applicable
EVAL RECOMMENDATION	:	Not Applicable
LISTED USE	:	100 H monthly w/l measurement, 20Nov86↔12Sep94
CURRENT USER	:	BHI ER w/l monitoring WHC ES&M RCRA sampling, PNL sitewide sampling
PUMP TYPE	:	Hydrostar
MAINTENANCE	:	

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4.0 CORRECTIVE ACTION PLAN

Corrective action with regard to residual contamination in the soil and groundwater associated with the 183-H Solar Evaporation Basins has already started. A significant amount of contaminated soil has been excavated from beneath the former concrete basins and has been moved to the ERDF, in accordance with the 183-H Closure Plan contained in the Permit (Ecology 1994) and the action memorandum for disposal of 183-H concrete and soils (DOE-RL et al. 1996). Soil removal was completed at 183-H on May 7, 1997. Groundwater remediation under the CERCLA ROD for the 100-HR-3 Operable Unit (EPA 1996) begins in July 1997 with the startup of a pumping well network and ion exchange treatment system that will remove chromium and some co-contaminants.

4.1 SOIL COLUMN CORRECTIVE ACTION

The majority of soil column contamination has been removed as described in Section 1.2. Nitrate and fluoride remain in the soil column above groundwater protection standards between the bottom of the excavation (6.1 m [20 ft] below grade) and the water table (approximately 4.6 m [15 ft] vertical area), under the former Basin 1. Clean backfill has been added to minimize infiltration of moisture. Institutional controls are in place to prevent human activities that might enhance soil moisture (e.g., irrigation). Final disposition of remaining nitrate and fluoride in the soil underlying the former 183-H facility will be addressed in a final feasibility study and ROD for the 100-HR-1 Operable Unit.

4.2 GROUNDWATER CORRECTIVE ACTION

Groundwater contamination from 183-H waste is still present in groundwater near the former 183-H Basins. Corrective action to remove hexavalent chromium is being undertaken as an interim remedial measure for the entire 100-HR-3 Groundwater Operable Unit. The treatment methodology will remove hexavalent chromium from groundwater, and some nitrate, technetium-99, and uranium. Whether or not fluoride will be retained by the Dowex 21K resin has not yet been demonstrated, but the resin is expected to do so. Final disposition of groundwater contamination from all sources in the 100-H Area will be addressed in a final feasibility study and ROD for the 100-HR-3 Operable Unit, should the CERCLA IRM action not remediate all contamination.

4.3 REMEDIATION EXPECTATIONS DURING THE IRM

The interim remedial measure for chromium is designed to remove hexavalent chromium from groundwater using an ion exchange resin. The resin is expected to also remove some nitrate, fluoride, technetium-99, and uranium (strontium-90 will not be removed), although hexavalent chromium will be removed preferentially. Determining how well the ion exchange resin will perform in removing these co-contaminants and 183-H waste indicators is an objective of the IRM performance monitoring program.

Selection of final remediation alternatives for the soil column associated with the 183-H TSD unit and the underlying groundwater will be done after completion of final feasibility studies for the 100-HR-1 and 100-HR-3 Operable Units. Information gained during the pump-and-treat remediation activities for chromium in groundwater will play a prominent role in guiding the final RODs for these operable units. Also, groundwater monitoring data obtained under the RCRA program (Hartman 1997), the CERCLA remedial investigation (Peterson and Raidl 1996), and the CERCLA interim remedial measure (DOE-RL 1997) will be used in a focused feasibility study to help identify the optimal final remediation alternative.

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5.0 PERSONNEL TRAINING DURING POSTCLOSURE

This section describes the training of the groundwater sampling and analysis task leader and sampling personnel required to complete postclosure care requirements as contained in this postclosure plan.

The training of the sampling and analysis task leader and sampling personnel will receive either classroom instruction or on-the-job training. Sampling and analysis personnel will be trained to perform these functions in accordance with the Hanford Analytical Services Quality Assurance Requirements Documents (DOE-RL 1996c). A person successfully completing the required training courses will be qualified as a groundwater sampler and/or task leader. All personnel will undergo training and at least an annual review for required course.

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7.0 CLOSURE CONTACT

The RL will be the official contact for 183-H Solar Evaporation Basins during the postclosure period at the following address:

Director, Regulatory Compliance and Analysis Division*
U.S. Department of Energy
Richland Operations Office
P.O. Box 550
Richland, Washington 99352

*or its equivalent should there be a future reorganization at RL

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8.0 CERTIFICATION OF POSTCLOSURE

No later than 60 days after completion of the postclosure care period, RL will submit to Ecology a certification of completion of postclosure care. RL and an independent registered professional engineer will sign this certification, stating that postclosure care for the unit was performed in accordance with the approved closure plan. The certification will be submitted by registered mail or an equivalent delivery service. Documentation supporting the independent registered professional engineer's certification will be supplied upon request of the regulatory authority.

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